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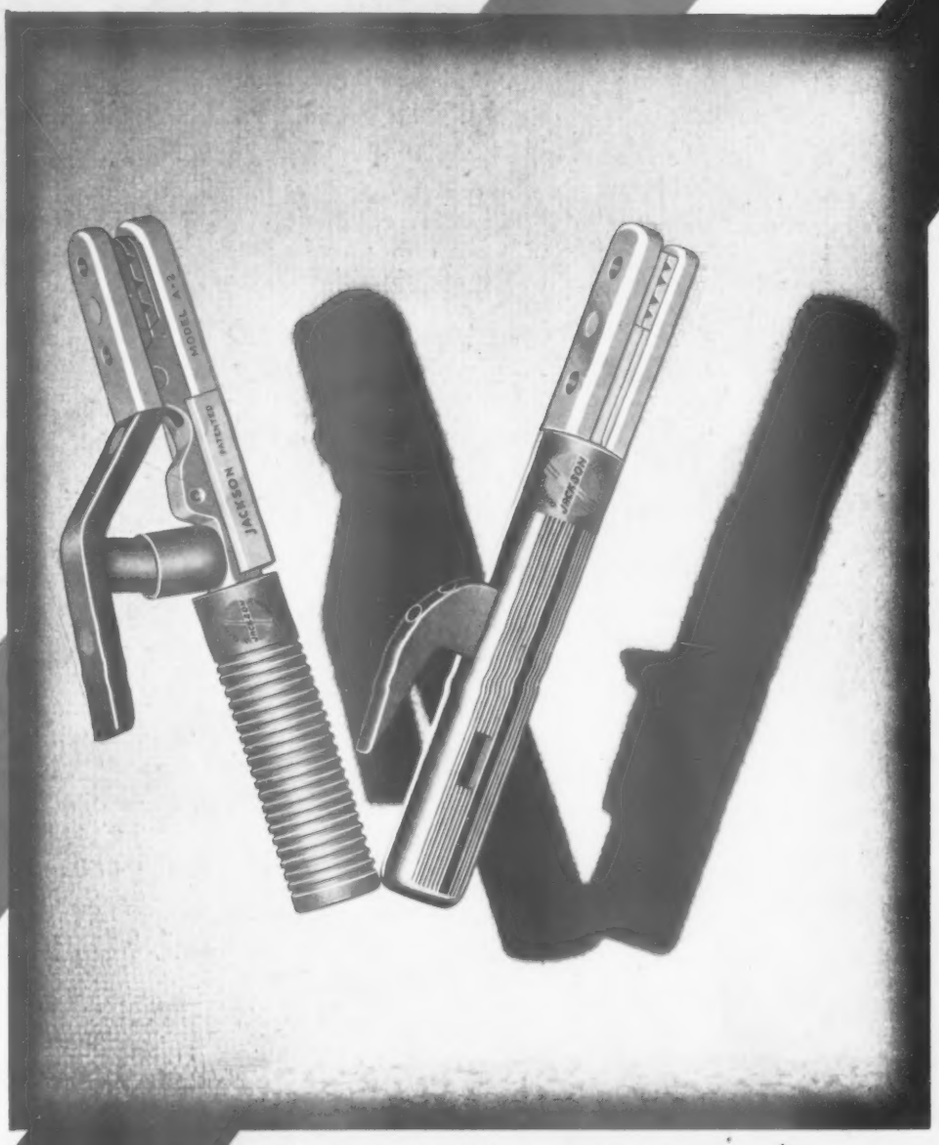

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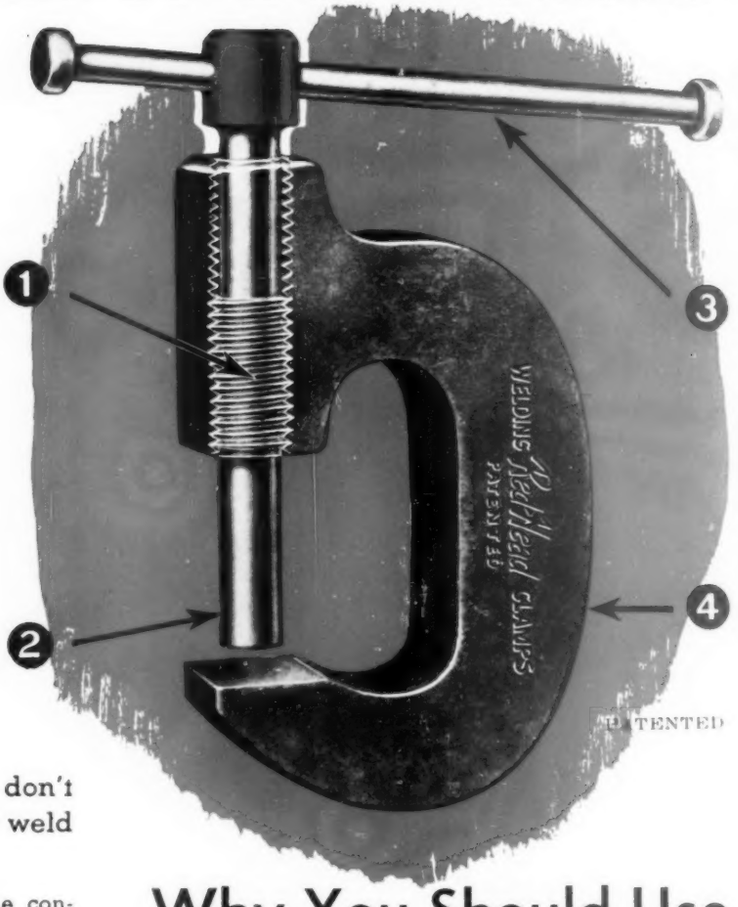

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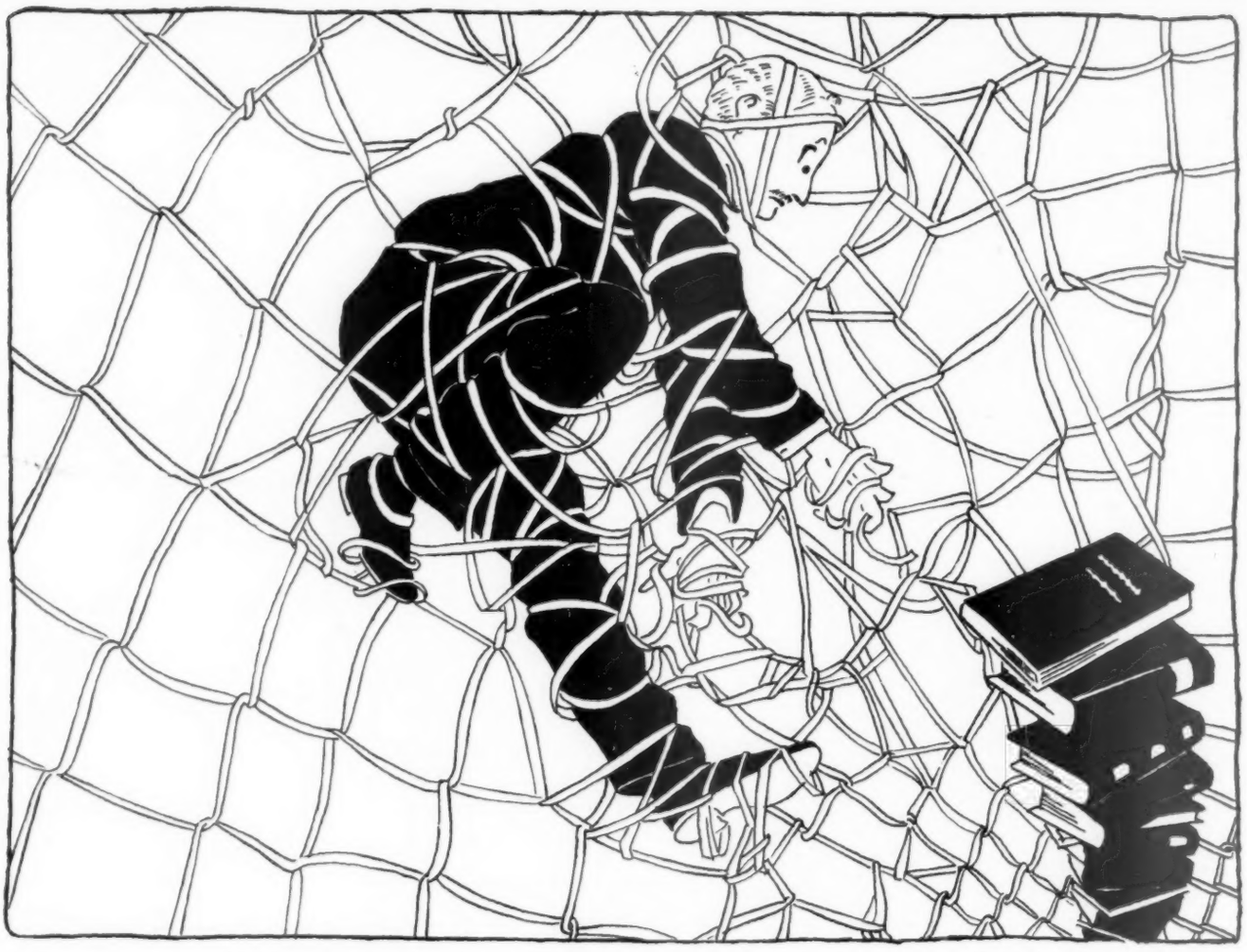

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What Welding Control Where?

By C. E. SMITH
Control Engineer, Westinghouse Electric and Mfg. Co.
East Pittsburgh, Pa.

Timing is one of the three fundamental factors of resistance welding which must be controlled. Welding current timing may be accomplished in a number of ways.

RESISTANCE welding is defined by the Resistance Welding Manufacturers Association as a metal fabricating process in which the fusing temperature is generated at the joint by the resistance to the flow of an electric current.

Three fundamental factors must be controlled by the welding machine, current, time, and pressure. Pressure is obtained by air, combinations of air and mechanical means, or by hydraulic power. Current may be controlled by a contactor in series with the primary of the welding transformer and the power supply line. Welding current has three fundamental variables that must be accurately controlled for consistent results. These are:

1. Timing, or length of current flow.
2. Characteristic of the current wave during weld.
3. Value of the current per given weld.

Timing the welding current may be accomplished by one of these several methods.

1. Manually timed magnetic contactors.
2. Mechanically timed magnetic contactors.
3. Electrically timed magnetic contactors.
4. Synchronous-motor-operated contactors.
5. Electrically or mechanically timed ignitron tube contactors.
6. Fully synchronous electronic timers.

The first three methods are relatively inexpensive but their use is limited to the more readily weldable materials. Inherent accuracy limitations often preclude their use in the new short-time welding with its exacting requirements.

The synchronous-motor-operated contactor is a relatively inexpensive means of obtaining a higher degree of timing than can be obtained with the first methods, but along with the maintenance of the contactor tips it has the disadvantage of requiring continuous adjustment and maintenance in order to close and open its contacts at the exact zero point of the current wave.

The ignitron tube contactor, while not subject to mechanical wear or arc burning, has the disadvantage, when controlled by mechanical or electrically timed relays, of being unable to close or "fire" at the exact instant on the voltage wave corresponding to zero current (power factor angle of the load). If the "firing" of the tube agrees with the natural angle of the load a minimum of transient in the line may be expected. However, the ignitron can never fire at zero voltage but must wait to obtain sufficient forward voltage to ionize or "fire". Even with this inherent fault it does offer an improvement over the other contactors.

If the load circuit is closed by a mechanical contactor at the zero point on the voltage wave, the current during the first half cycle will reach a greater peak value than it

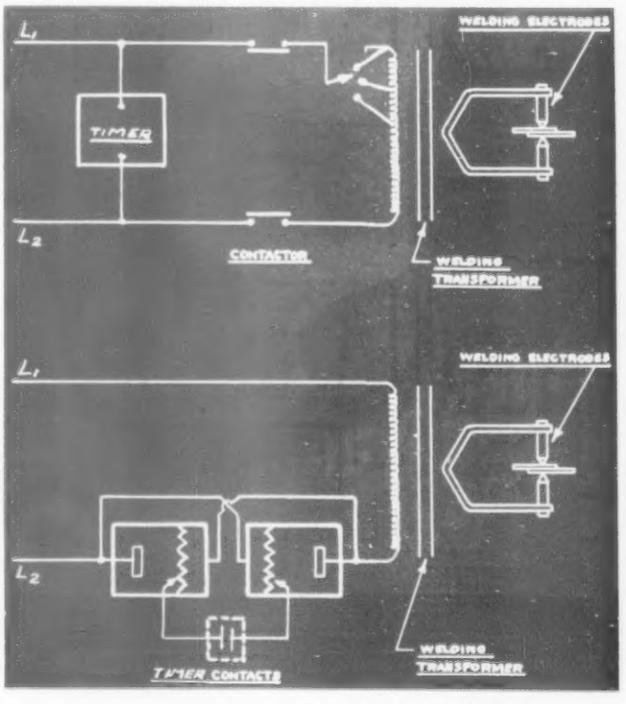
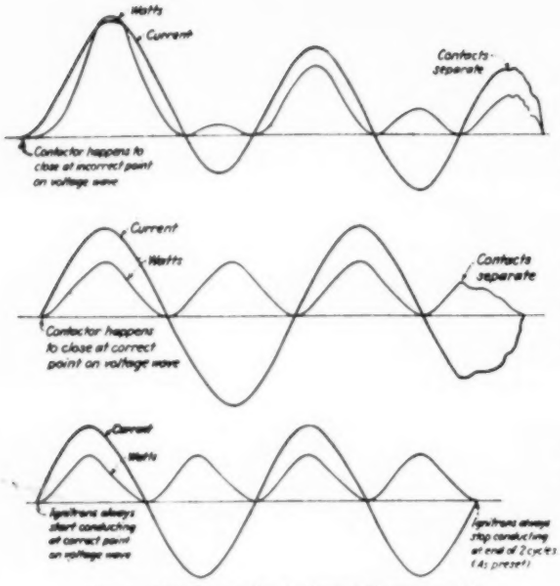


Fig. 1 — Schematic circuit of a simplified contactor in series with the primary of the welding transformer and the power supply line for the control of resistance welding.

Fig. 2—A control circuit using an ignitron tube contactor in series with the welding transformer.


Watts
Current
Contacts separate
Contactor happens to close at incorrect point on voltage wave
Current
Watts
Contacts separate
Contactor happens to close at correct point on voltage wave
Current
Watts
Ignitrons always start conducting at correct point on voltage wave
Ignitrons always stop conducting at end of 2 cycles (As preset)

Weld No. 1—Using timed contactor adjusted for 2 cycles but showing typical timing error. Total watt-seconds or heat input 193 per cent of correct 2 cycle timing heat.

Weld No. 2—Using timed contactor adjusted for 2 cycles but showing typical timing error. (See Weld No. 1.) Total heat 88 per cent showing serious inconsistency in heat input.

Weld No. 3 — Using ignitron timer also adjusted for 2 cycles. Welds all are identical, showing consistency of timing and heat input. Compare with Welds No. 1 and 2 with timed contactor.

Fig. 3—Oscillographs of three different welds.

will during the remaining cycles, and this value diminishes until a steady static condition of welding current is reached. With relatively long welding time this variable is of little importance, but with short timing, since heating of the work is proportional to the square of the current, the weld will receive inconsistent values of heat in a given time according to the closing point on the voltage wave. Another condition that must be accounted for is that, if the circuit is closed at the zero point on the voltage wave, the iron in the welding transformer will reach saturation before the end of the first half cycle. The primary current may then reach a value of several times normal since under complete saturation the current is mainly limited by the resistance of the primary. The resulting transient may cause a serious voltage dip on the power feeders, and the heat of the weld may actually be less than in the case where the transient is eliminated. Elimination of this transient gives lower secondary current values, reducing overheating of the electrodes and spitting or flashing at the weld.

Fully synchronous electronic timers, with their accuracy and ability to close the circuit at the correct voltage instant to agree with the natural power factor angle of the welding load, are essential for consistent high quality welds.

Heat Variables

As mentioned before, heat varies as the square of the current, or more completely, heat is—I^2Rt. Then the heat for each weld varies not only as the square of the values of current, but also directly with the time duration of current flow. Since the mechanical or magnetic contactors contain inherent faults of change in weld time, and variations in starting instants on the voltage wave, it is usually necessary to lengthen the time so that the results due to these inherent variables are reduced to a smaller percentage of the total heat.

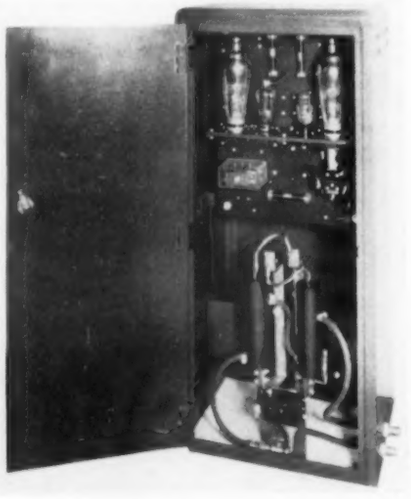


Fig. 4—A fully synchronous ignitron spot welding timer used in precision spot welding.

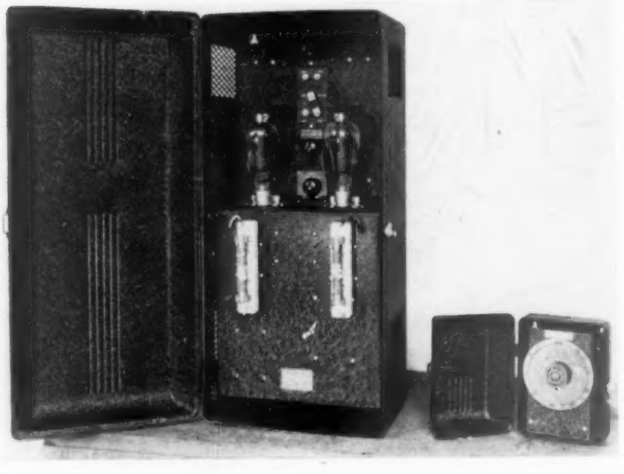


Fig. 5—The application of electronic timers in conjunction with ignitrons for heat control. This may be used with any timer to control the welding current.

Electronic Control

Spot Welding

Spot welding, being the most widely used of any of the resistance welding processes, is performed using a pair of proper electrodes, and some means of applying pressure and current to weld sheet or other semi-flat structures. The range of spot welding permits wide application; from low to high currents, with welding from thin foils to heavy plate, as well as the welding of non-ferrous alloys, using kva requirements from one to several thousand.

Since strength of welds is of utmost importance when welding is used for applications of a structural nature, the welding time must be correct in relation to current and pressure, and must be identical for each and every weld.

Many metals and alloys are difficult to weld without electronic timers. Unlike mild steel, aluminum and many other metals and alloys have sharp fusion points, and hence narrow ranges of current, pressure, and time within which good welds are obtained.

Brass is an alloy requiring short and accurate timing. Vaporization of the zinc content may be caused by long time durations. The resultant is a crystalline structure and weak weld.

Stainless steel changes its grain structure if not welded in a short, correct time.

Dissimilar materials and alloys are difficult to weld because of the narrow range within which both will weld and not damage either material. But, with absolute control of all variables and correct welding machine design, these welds are made possible today with the aid of fully electronic timers.

Ignitron spot welding timers have proved eminently successful in precision spot welding. Units are designed and calibrated to apply power to the welding machine with an adjustable time interval of from one to thirty cycles.

The Ignitron Tube

The ignitron is a water cooled evacuated metallic vessel containing a graphite anode, a mercury pool cathode, and an ignition electrode dipping into the mercury pool. If the electrode or ignitor is made positive with respect to the pool and current allowed to pass, a spark occurs at the junction of the pool and ignitor. This tiny spark immediately expands into an arc which quickly transfers to the anode if the latter is sufficiently positive at that instant.

Electronic heat control is accomplished by delaying the point of ignition of the ignitrons at a particular point on the voltage wave, thus interposing variable zero-current gaps in the individual current loops that generate heat for the weld.

Projection Welding

Projection welding is a special adaptation of normal spot welding. Prior to the welding, one or more projections of the desired shape and size are pressed into one or both work pieces. When power is applied, welds are made where the projections contact the piece. Numerous spots may be made at one weld depending upon the power available. This type of weld is adaptable to sheets, plates, forgings, tubing, and most all stamping fabrications.

Since the ignitron tube has the ability to handle high instantaneous current values, and because its ignition may be controlled at will, the ignitron spot timer is usually favored for this type of weld.

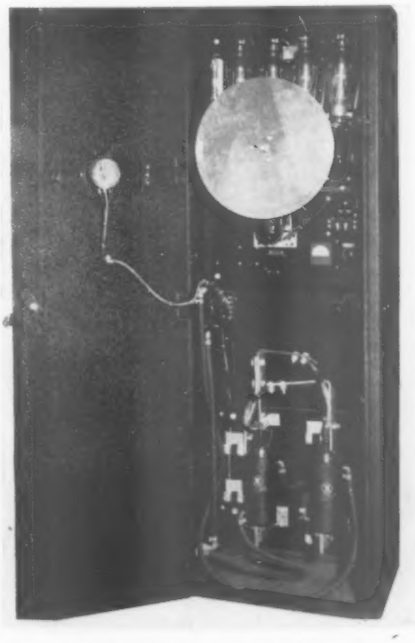


Fig. 6—A seam welding timer.

Flash and Flash-Butt Welding

This type of resistance welding differs from spot welding in the procedure employed to obtain heat necessary to raise the metals to a temperature within the plastic range of the material itself. The work pieces are clamped in the current carrying jaws or dies, the work brought together under considerable pressure, and current applied. The weld current heats the work at the joint, softening it and making a weld with a slight upset. In some cases the weld is annealed by reheating the joint in annealing dies.

Flash-butt welding is accomplished in the same manner except the current is applied as soon as the work is clamped, and when the two pieces of metal come in contact a vigorous arcing or flashing is created. When the pieces reach the temperature within the plastic range their abutting surfaces are very rapidly forged together under high pressure, thus completing the weld.

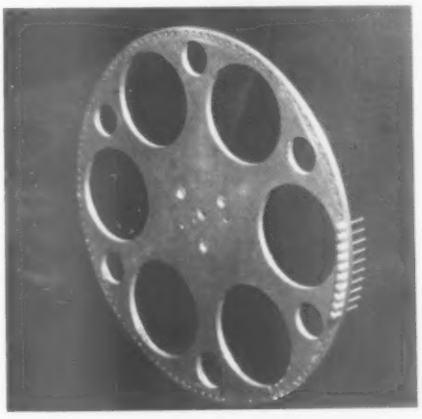


Fig. 7—A seam timer disc set for 5 cycles — on.

Here again ignitrons are favored because of their easy handling of the heavy currents required for this work. Although an electronic timer may not be essential for these types of welding, an exact control of heat is beneficial, and the application of electronic heat control in conjunction with ignitrons has aided this type of welding in reaching its high degree of perfection.

Seam Welding

Seam welding consists of a long series of spots welds, made in rapid succession on a wheel-electrode type of machine. The resulting weld has a stitched appearance. Spacing of the spots is determined by the speed of the wheel and the time OFF and time ON of the current during welding.

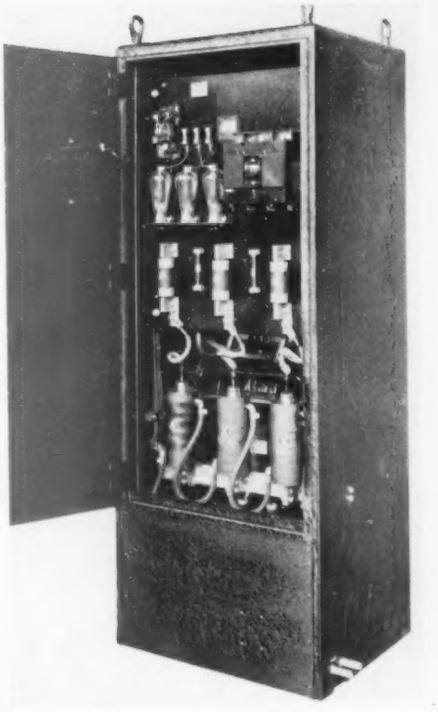


Fig. 8—Ignitron welding rectifier which converts the D-C power for the welding transformer from a three phase A-C supply.

Seam Welding Timing

The ignitron power circuit for the seam welding timer is essentially the same as that for spot welding. The control tubes fire the ignitrons, and the heat control is the same electronic circuit as in the spot timer. However, the timing circuit differs in that for seam welding it must control the off time as well as the on time. This is accomplished by using a synchronous driven induction generator to provide timing, in place of the capacitor charging circuit. A timing disc is driven at exactly one revolution per second by a synchronous motor, and contains 120 holes evenly spaced around its periphery. Pins are inserted in the holes and, upon their passage between the narrow poles of an inductive pickup, an impulse is generated in the grid circuit of the ignition control tubes. The timing, off and on, is simply selected by inserting pins in the disc for time on, and leaving out the correct amount of pins for time off. Each pin is equal to ½ cycle.

Pulsation Welding

Pulsation welding is similar to spot welding with the exception that the current, or heat is applied repeatedly for the making of a single

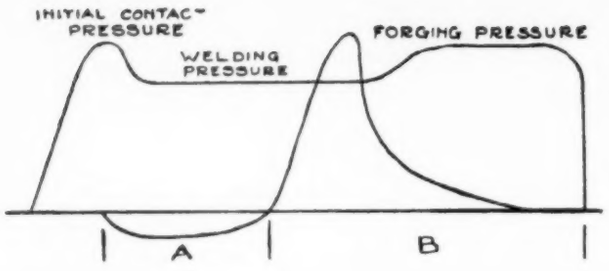


Fig. 9—Wave shape of current and pressure in the magnetic stored energy process.
A.—Secondary current during charge
B—Secondary current during discharge

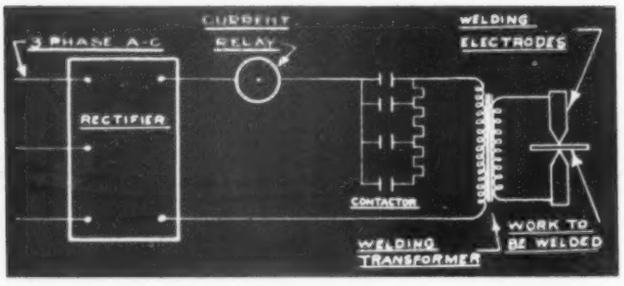


Fig. 10 — Schematic drawing of magnetic stored energy welder.

weld. It may be likened to a seam welder with the wheels stationary. This type of weld has often been called "interrupted spot welding, or woodpecker welding" and has been used to advantage in spot, butt, and projection welding, particularly in the field of heavy sections.

In this operation the fully synchronous timer has decided advantages over non-synchronous control. Since the electrodes are closed during the total on, plus the time off for a given weld, the shorted secondary of the welding transformer traps the magnetic flux, with the result of an ease in transformer saturation created by closure of the power circuit ahead of the natural power factor angle of the load. If the time off is extended to allow the transformer flux to decay, it may be possible to use an ignitron contactor, providing transients and direct current components in the power line do not result in too high a current demand, voltage fluctuations, or transformer heating.

Since pulsation welding involves a greater amount of power switching, use of a contactor with moving parts is seldom recommended. The spot welding timer previously described is normally used in conjunction with sequence controls for this type of work. Sequence panels consist of separate tube timers with time distinction for weld period, squeeze, hold, and cool period. The current may be made repeatable or non-repeatable by the flipping of a switch.

The standard seam timer panel may be used for this type of work and it has the advantages of being able to furnish different time on and off during the total weld period. A program timer has recently been developed where it is deemed necessary to have over one second total weld period or when variations of heat are wanted between welds.

Stored Energy Welding

In the past year, two new types of resistance welding control have appeared, namely, the magnetic stored energy and electro-static stored energy in processes. Their outstanding advantage is that they store energy slowly and discharge it quickly to make a weld. This stored energy method requires about 40 to 50 kw at an approximate unity power factor, three phase line. In comparison, the instantaneous power demand of a conventional A-C spot welder when welding the same pieces of .080 in. aluminum is approximately 250 kva at 30 per cent power factor, single phase line.

Electro-Magnetic

The principle of operation of the magnetic stored energy process may be best understood by reference to Figs. 9 and 10. In Fig. 10, the D-C power for the welding transformer is converted from a three phase A-C supply by the ignitron welding rectifier. The work is placed between the electrodes and the contactor closed. The current starts to build up from zero following the L/R constants of the circuit. After the current reaches a determined value pre-set at the maximum energy relay the contactor opens and the rate of change of current due to this rupture induces an instantaneous current of high magnitude in the secondary and hence the weld. Since a high voltage is induced by the contactor rupture, the contactor is sequenced and arranged to progressively insert resistance in the primary circuit and thus finally rupture the current entirely.

Electro-Static

The electro-static stored energy process utilizes a bank of capacitors for weld energy. Fig. 12 shows a simplified schematic diagram of the circuit. During the time that the electrodes are open S1 is closed and the capacitor charges to a pre-set voltage value. To make a weld, the material is placed between the electrodes and after a given pressure the contact S1 is opened and the contact S2 is closed dumping the capacitor energy into the welding transformer. The circuit may be oscillatory depending upon the circuit constants and, if so, the secondary current may be as shown in Fig. 11.

Both of the above methods, due to their high instantaneous and short time current duration, have brought the spot welding of aluminum, particularly in the airplane industries, to a higher degree of perfection.

THE END

Fig. 11—Current flow during weld of the capacitor discharge process.

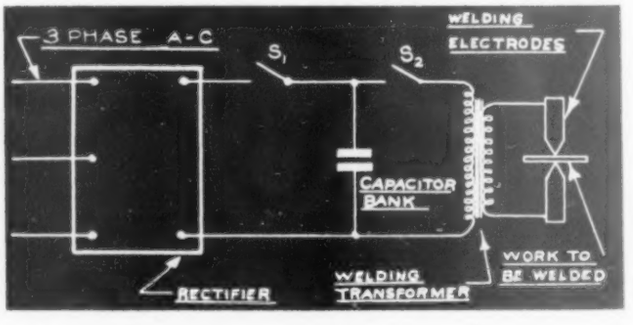


Fig. 12—Simplified circuit of the electrostatic stored energy process showing a 300 v., D-C, 40 KW rectifier.

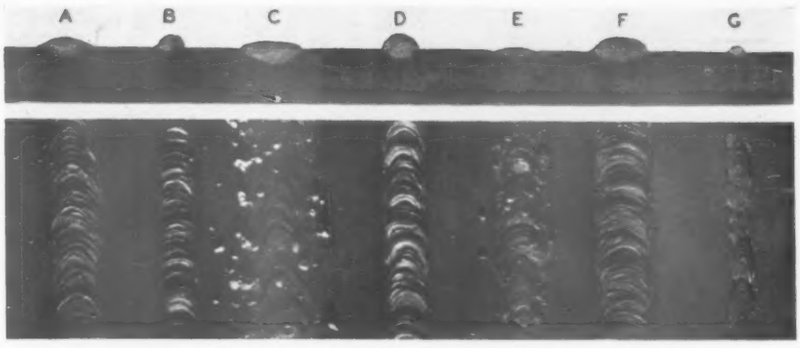


Fig. 1—Plan and elevation views of welds made with shielded arc electrode under various conditions. (A), current, voltage and speed normal; (B), current too low; (C), current too high; (D), voltage too low; (E), voltage too high; (F), speed too low; (G), speed too high.

Conservation in Welding

By CLAYTON B. HERRICK
Welding Engineer, The Lincoln Electric Co.
Cleveland, Ohio

Here are sixteen ways to reduce electrode consumption while delivering the goods. Conserving material is not only good sense but extremely vital to our Victory program.

PRESENT day demands on industry to produce materials in our war production program makes it necessary to eliminate waste. The necessity of conserving materials in the war effort is no where more urgent than in the use of welding.

Welding is the key process which is making possible production of war ships, military planes, tanks and practically all other war equipment at the tremendous speeds which are vital to this country's speedy and complete victory.

In order that welding may contribute its utmost potentiality in war production, it is important that welding materials be utilized to maximum advantage. This applies particularly to welding electrodes.

The electrode for welding is probably the most essential piece of war industry equipment today. It is the electrode which provides the metal of proper physical properties and operating characteristics permitting production of highest quality welds in minimum time and at minimum cost.

There are a considerable number of factors which affect the most efficient use of electrodes. If conscientiously controlled, these factors will contribute to best use of welding in the war effort. The result will be a still faster rate of production by the use of welding and full utilization of the materials which welding equipment manufacturers are producing at peak capacity.

Conservation Factors

The factors which have an important bearing on this situation follow:

(1) *Select the right type of joint and be careful of fit-up:* There is a type of joint best suited to the particular job. A serious disadvantage in waste of weld metal results by using a complicated joint where the more simple type of connection will suffice. Since the type of joint greatly affects the amount of metal required, it is suggested that a study be made to make sure the joint is proper for the particular application. Obviously, the joint to select is the one which meets requirements at the greatest speed and the lowest cost.

Joints and their fit-up should be given most careful consideration, as fit-up affects not only the cost of the welded joint as such, but also the performance of the finished product. As an illustration of the effect upon cost in a very simple fit-up, notice the case shown in Fig. 2, where there is shown a T-weld with ¼ in. plates. Assume that the cost of deposited metal is $1.00 per lb, Then if the joint is properly fitted up, the cost per foot of joint (two beads), would be $0.40. If, however, there is a gap between the vertical plate and the horizontal plate of $\frac{1}{16}$ in., the cost is increased to $0.58 per foot. If this discrepancy is ⅛ in., the cost is increased to $0.80 per ft., resulting in a difference of $0.18 to $0.40 for $\frac{1}{16}$ in. and ⅛ in. respectively (Table I). Obviously money spent in obtaining good fit-up is readily saved in welding.

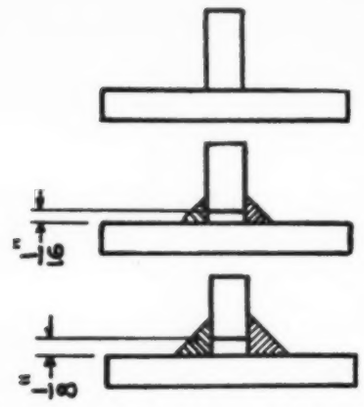


Fig. 2—Variations in fit-up of joints affects electrode consumption to large extent.

Table I—Weld Joint Costs

Lbs./Ft. of Joint	.40	.58	.80
Cost/Ft.	$0.40	$0.58	$0.80
Increase in Cost		.18	.40

Table II—Effect of Changing Electrode Size

Electrode Size	1/8	5/32	3/16	1/4	5/16	3/8
Amperes	110	130	150	250	325	425
Arc Volts	24	25	26	30	34	38
K.W. at Arc	2.64	3.25	3.9	7.5	11.1	16.1
Consumption Rate, Lbs. Per Hr.	2.6	3.3	3.95	7.5	10.7	16.2
Deposit, Lbs. Per Hr. (50% Operating Factor)	0.87	1.1	1.32	2.5	3.57	5.4
Efficiency of Set (%)	47	50	51	55	59	59
Kilowatt Input	5.6	6.5	7.65	13.65	18.8	27.3
Interruptions Per Lb. Consumed	18	12	8	5	3	2
Cost Per Pound Deposited						
Labor	$1.150	$0.909	$0.758	$0.400	$0.280	$0.185
Overhead	1.150	.909	.758	.400	.280	.185
Power	.064	.059	.058	.055	.053	.051
Electrode	.150	.135	.127	.127	.127	.127
Cost of Interruption (Including Overhead)	.050	.033	.022	.014	.008	.005
	$2.564	$2.045	$1.723	$0.996	$0.748	$0.553

(2) *Choose the correct type of electrode:* While the general purpose electrode will produce satisfactory welds under virtually every condition, special electrodes as for example heavily coated fast flowing types would prove more efficient. The electrode should be chosen with respect to: (a), physical properties required; (b) type of joint; (c) position of welding, that is, flat, vertical, overhead or horizontal; and (d) condition of fit-up of the work. Recommendations of the equipment manufacturer should be considered.

Electrode Qualities

(3) *Use an electrode which has and maintains a uniform coating:* The electrode coating, if not correct, will cause rejects not only of the electrodes themselves but possibly of the welds produced by their use. It should be remembered that the coating not only produces the protecting shield but it also controls: (a) fluidity of the metal; (b) penetration; (c) shape of the beads; (d) physical properties of the deposit; and (e) composition of the deposit.

(4) *Use electrodes which provide proper physical properties:* Electrodes manufactured today are clearly described by the manufacturer in respect to the quality of weld they will produce. Required physical properties of the work at hand should be known and the electrode should be selected to meet these requirements.

(5) *Use fast flowing electrodes wherever possible:* Certain electrodes are manufactured today to permit the fastest possible welding under specified conditions. It is obvious, therefore, that electrode and, hence, time will be saved if these fast flowing types are used wherever practical.

(6) *Select an electrode which keeps splatter and slag loss at a minimum:* Since all splatter is a waste of weld metal, the importance of this is obvious. It should be realized that the splatter loss of the electrodes vary and care should be taken to avoid use of those which have excessive losses.

(7) *Wherever possible use electrodes which produce flat beads:* It is a waste of welding electrode to deposit any more metal than is required.

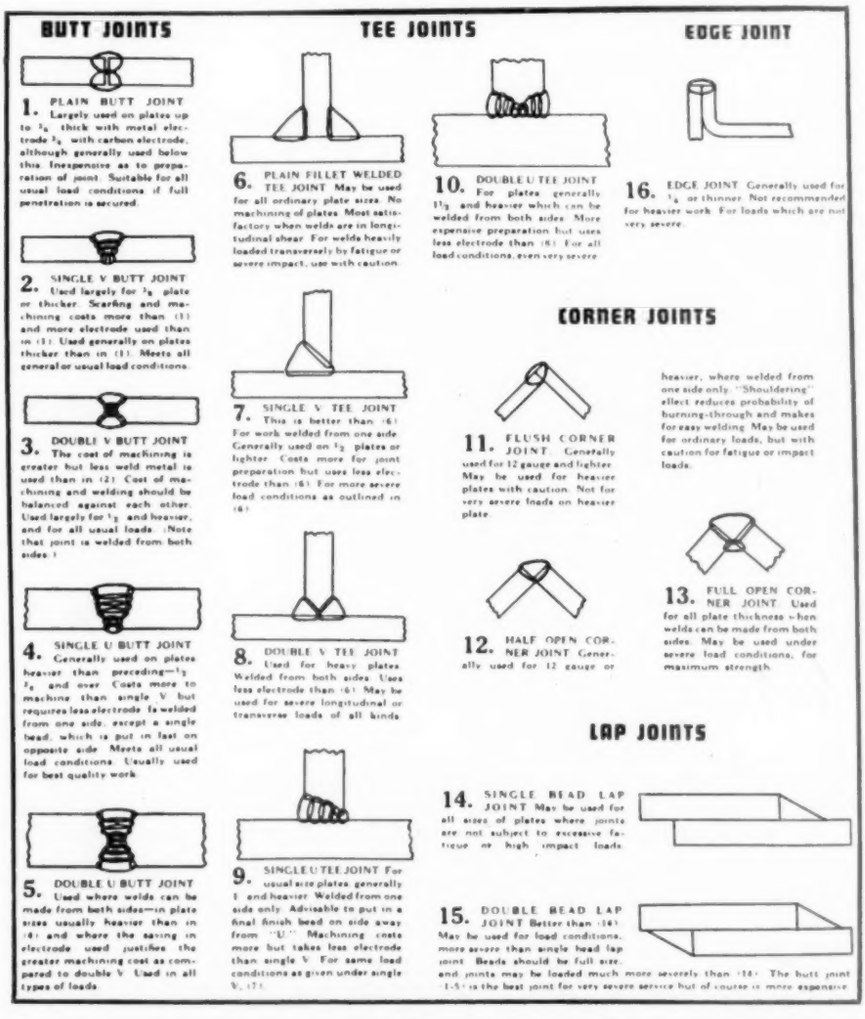

BUTT JOINTS
1. PLAIN BUTT JOINT Largely used on plates up to 3/8 thick with metal electrode 3/8 with carbon electrode, although generally used below this. Inexpensive as to preparation of joint. Suitable for all usual load conditions if full penetration is secured.
2. SINGLE V BUTT JOINT Used largely for 3/8 plate or thicker. Scarfing and machining costs more than (1) and more electrode used than in (1). Used generally on plates thicker than in (1). Meets all general or usual load conditions.
3. DOUBLE V BUTT JOINT The cost of machining is greater but less weld metal is used than in (2). Cost of machining and welding should be balanced against each other. Used largely for 1/2 and heavier, and for all usual loads. (Note that joint is welded from both sides.)
4. SINGLE U BUTT JOINT Generally used on plates heavier than preceding—1/2 3/4 and over. Costs more to machine than single V but requires less electrode. Is welded from one side, except a single bead, which is put in last on opposite side. Meets all usual load conditions. Usually used for best quality work.
5. DOUBLE U BUTT JOINT Used where welds can be made from both sides—in plate sizes usually heavier than in (4) and where the saving in electrode used justifies the greater machining cost as compared to double V. Used in all types of loads.
TEE JOINTS
6. PLAIN FILLET WELDED TEE JOINT May be used for all ordinary plate sizes. No machining of plates. Most satisfactory when welds are in longitudinal shear. For welds heavily loaded transversely by fatigue or severe impact, use with caution.
7. SINGLE V TEE JOINT This is better than (6). For work welded from one side. Generally used on 1/2 plates or lighter. Costs more for joint preparation but uses less electrode than (6). For more severe load conditions as outlined in (6).
8. DOUBLE V TEE JOINT Used for heavy plates. Welded from both sides. Uses less electrode than (6). May be used for severe longitudinal or transverse loads of all kinds.
9. SINGLE U TEE JOINT For usual size plates generally 1 and heavier. Welded from one side only. Advisable to put in a final finish bead on side away from "U". Machining costs more but takes less electrode than single V. For same load conditions as given under single V, (7).
10. DOUBLE U TEE JOINT For plates generally 1 1/2 and heavier which can be welded from both sides. More expensive preparation but uses less electrode than (8). For all load conditions, even very severe.
EDGE JOINT
16. EDGE JOINT Generally used for 1/4 or thinner. Not recommended for heavier work. For loads which are not very severe.
CORNER JOINTS
11. FLUSH CORNER JOINT Generally used for 12 gauge and lighter. May be used for heavier plates with caution. Not for very severe loads on heavier plate.
12. HALF OPEN CORNER JOINT Generally used for 12 gauge or heavier, where welded from one side only. "Shouldering" effect reduces probability of burning-through and makes for easy welding. May be used for ordinary loads, but with caution for fatigue or impact loads.
13. FULL OPEN CORNER JOINT Used for all plate thickness when welds can be made from both sides. May be used under severe load conditions, for maximum strength.
LAP JOINTS
14. SINGLE BEAD LAP JOINT May be used for all sizes of plates where joints are not subject to excessive fatigue or high impact loads.
15. DOUBLE BEAD LAP JOINT Better than (14). May be used for load conditions more severe than single bead lap joint. Beads should be full size, and joints may be loaded much more severely than (14). The butt joint (1-5) is the best joint for very severe service but of course is more expensive.

Fig. 3—Proper joint to select is the one which meets service requirements and costs the least. Obviously, if requirements are met by the simpler type of joint, which requires less machining and less electrode, it is a waste of time, labor and materials to use a more complicated type.

Not only is the welding electrode itself wasted but useless time is required to remove the excess metal from the welded joint.

(8) *Select the right size electrode:* The largest diameter electrode which can be used effectively is the best from the standpoint of electrode conservation. The saving runs up to 40 per cent per lb. deposited, for example, when ¼ in. is used instead of $\frac{3}{16}$ in. (See Fig. 4 and Table II).

(9) *Use long electrodes in the larger size:* The obvious result is the reduction in the number of stub ends and in the time saved by eliminating interruptions to change rods. The 18 in. length should be used in ¼ in. and larger sizes.

(10) *Do not bend electrodes:* This generally unnecessary habit will waste from ¼ to 1/3 of the electrode. Use electrodes straight and get the maximum of deposited weld metal from each rod.

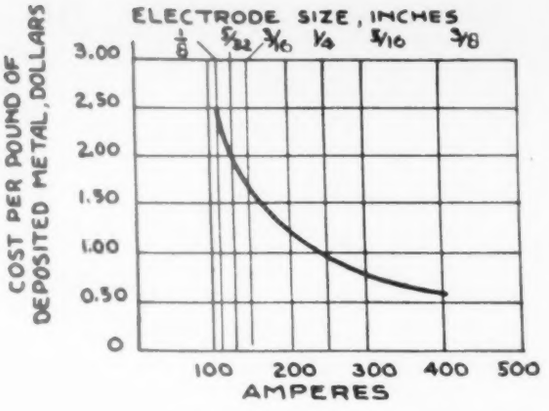


Fig. 4—Effect of electrode size on economy is shown in the chart at left and Table II. Note how the cost of welding goes down as electrode size goes up. Note, also (Table II), electrode consumption rate, pounds of electrode deposited per hour, number of stub ends (indicated by interruptions per pound consumed), and cost of interruptions to change electrodes.

(11) *Use proper voltage and current settings:* Every electrode manufactured is designed to operate at a certain voltage and within a specified current range. If current is too high or too low, it will manifest itself either in excessive splatter loss or inferior welds (Fig. 1), having improper fusion and penetration. (Also Fig. 5).

(12) *Follow the procedure specified for the electrode:* Accompanying each different electrode manufactured are detailed specifications regarding procedures to be followed. These specifications have been prepared carefully by the electrode manufacturer and, if followed consistently, will prevent waste of electrode and assure high quality welding.

(13) *Avoid using an excessive number of beads:* If one bead of weld metal will meet design requirements, it is obviously a waste of electrode to add additional beads. This same applies to applications where two beads suffice. Additional beads are simply a useless waste of electrode.

(14) *Use electrode down to minimum stub end:* Remember that the electrode can be used the entire length of its coated surface. Leaving any more than a minimum stub end is an obvious waste. By using care in gripping the electrode at its extreme end in the holder and burning it down to the maximum extent, the operator is rendering a patriotic service in saving electrode. Just ½ in. difference in stub end saves 3½% on an 18 in. length rod. The great variation in stub ends found in one welding shop indicated this waste amounted to 17½ per cent. In cost, for the time covered, it amounted to $268.36.

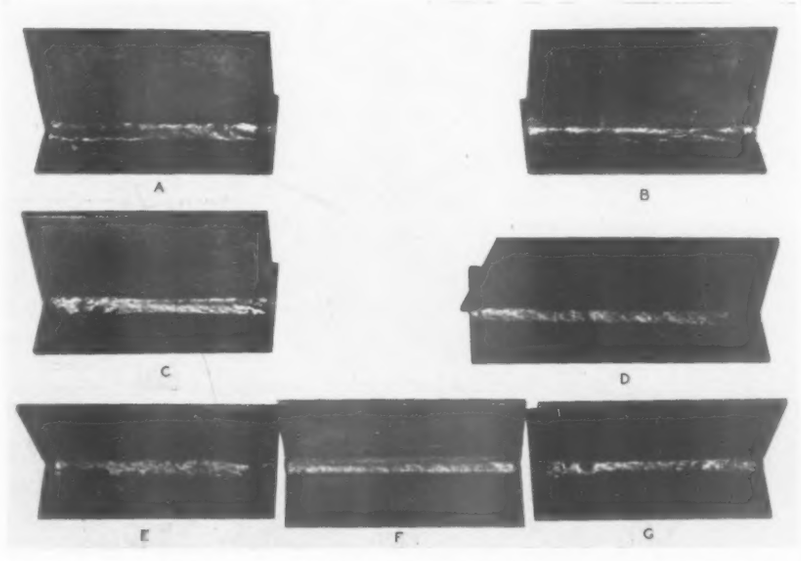


Fig. 5—Fillet welds made with shielded arc electrode under various conditions. (F), current, voltage and speed normal; (A), current too low; (B), current too high; (C), voltage too low; (D), voltage too high; (E), speed too low: (G), speed too high.

	"F"	"A"	"B"	"C"	"D"	"E"	"G"
ARC CURRENT	NORMAL	LOW	HIGH	NORMAL	NORMAL	NORMAL	NORMAL
ARC VOLTS	NORMAL	NORMAL	NORMAL	LOW	HIGH	NORMAL	NORMAL
ARC SPEED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	LOW	HIGH
BURN OFF OF ELECTRODE	NORMAL APPEARANCE COATING BURNS EVENLY	PRACTICALLY SAME AS PRECEDING	COATING IS CONSUMED AT IRREGULAR HIGH RATE-WATCH CAREFULLY	COATING TOO CLOSE TO CRATER TOUCHES MOLTEN METAL RESULTING IN POROSITY	DROPS AT END OF ELECTRODE FLUTTER AND THEN DROP INTO CRATER	NORMAL	NORMAL
PENETRATION FUSION (CRATER)	FAIRLY DEEP AND WELL DEFINED	NOT VERY DEEP NOR WELL DEFINED	DEEP, LONG CRATER	SMALL	WIDE AND RATHER DEEP	CRATER NORMAL	SMALL, RATHER WELL-DEFINED CRATER
APPEARANCE OF BEAD	EXCELLENT FUSION-NO OVERLAP	ON TOP OF PLATE, NOT AS MUCH OVERLAP AS WITH BARE ROD.	BROAD, THIN BEAD-GOOD FUSION	HIGH BEAD NOT AS PRONOUNCED AS FOR LOW AMPS. SOMEWHAT BROADER	WIDE SPATTERED	WIDE BEAD-OVERLAP LARGE. BASE METAL AND BEAD EXCESSIVELY HEATED	SMALL BEAD-UNDERCUT-REDUCTION IN BEAD SIZE AND UNDER CUTTING DEPENDS ON SPEED AND AMPERES
ARC SOUND	SPUTTERING HISS PLUS SHARP CRACKLING	IRREGULAR SPUTTERING, SOME CRACKLING	REGULAR EXPLOSIVE SOUNDS	HISS PLUS STEADY SPUTTER	SOFT SOUND PLUS HISS AND FEW CRACKLES	NORMAL	NORMAL

Fig. 6—Table of weld characteristics made with proper and improper procedure.

Save Stud Ends

(15) *Collect and save stub ends of electrode:* At the rate in which welding is being used today in war production, the amount of metal which would be wasted by failure to save stub ends would be tremendous. The average stub end is 2 inches long and this length multiplied by the millions of electrodes used, would constitute the great loss.

(16) *Use modern high capacity welding generator:* Welding generators manufactured today have much higher capacity and much greater efficiency. For example, a modern 40 v. generator was shown to produce 7.7 in. of joint per electrode as against 6.6 in. for an older machine.

Fig. 1 — Much of the brazing was done overhead.

All photos courtesy Airco

Brazing Copper Bus Bars

One of the largest bus bar systems in the country was fabricated by carbon arc and oxy-acetylene welding and brazing. Brazing with a phosphorous-copper alloy was used for field erection.

THERE have been many large bus bar installations throughout the United States in recent years. One of the largest installations ever attempted, however, was recently placed in service at the newly completed General Electric Co. building, Chicago. This system required 50,000 lbs. of 3 in. square ventilated copper tubing.

It is a four bar system—three bars are designed to carry 208 volts, 1800 amperes, 3 phase, 60 cycle current throughout the entire six floors of this company's Chicago manufacturing plant while the fourth bar carries the neutral phase. Three bars, 3 in. square copper tubing having ¼ in. wall thickness, are used to carry the 3 phase current while a single bar, 3 in. square copper tubing with ⅛ in. wall thickness, carries the neutral phase.

The entire installation was either welded or brazed. Welding of the bus bars was either by the carbon arc or the oxy-acetylene welding processes. All of the carbon arc welding was done in the plant of the producer of this bus bar tubing. This prefabrication involved mitering of all corner angles after which they were welded.

When the prefabricated sections arrived in Chicago, after having been shipped from New England, it was found that some of the joints had been damaged. These joints were readily repaired and re-welded using a dioxidized copper weld rod and the oxy-acetylene process of welding. While the welding of copper by the oxy-acetylene flame does not present any particular problem, it might be well to review the technique and welding procedure involved in the welding of copper.

Copper Welding

Excellent results can be expected in the welding of bus bar material inasmuch as the base metal is usually electrolytic copper which is practically oxygen-free. To get a good joint it is desirable to have a rod that is likewise oxygen-free, or has been dioxidized, and one which melts at approximately the same temperature as the base metal, that is, about 1980 F. The welding should be done rapidly with as little reworking as possible to avoid pinholes due to hydrogen and carbon dioxide, which are soluble in molten copper, but which are rejected when the copper cools and solidifies. Use a large flame and keep the end of the welding rod well in the puddle. The rod which was used on this particular job was used without flux. The resultant welds were quite strong with a smooth deposit of pure copper which would naturally give good electrical conductivity and also a joint which can be enameled readily.

All of the other joints, i.e., the straight line joints, jumpers, supports, etc., were brazed using the oxy-acetylene flame and a patented copper containing 5 to 10 percent phosphorous.

The bars were set in ebonite clamps which were left loose during welding to permit the bars to be wedged for alignment. No tight clamps were used during the brazing operation leaving the bar free to expand or contract at will. By using such a set-up there was no distortion of the bar and the locked up stresses in the finished system were practically eliminated.

Those bars in a wall thickness of ¼ in. wall were brazed having straight butt joints as is shown in Fig. 1. Just as the welding of the bus bars on this job presented no particular problem, the same can be said about the brazing operation.

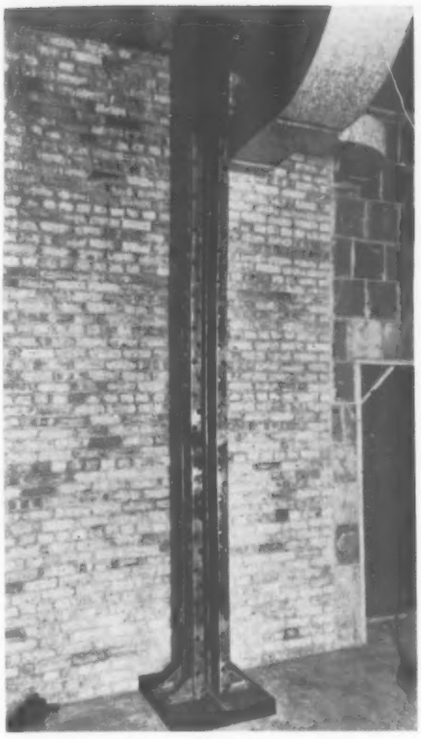


Fig. 2—These are vertical bus bars passing from one floor to another. Note the base.

However, here again it may be desirable to review some of the pertinent points so that the operation might be more thoroughly understood.

Brazing Application

The method of applying this patented phosphorous copper alloy is essentially the same as used for soft solders. The only practical difference is that the brazing alloy requires a higher temperature. Naturally, there are other differences and, of course, the application of a phosphorous brazing alloy depends upon the material to be brazed and upon the method of brazing. But, in general, the following practice was used throughout this bus bar system: 1. The surface of the joints was thoroughly cleaned of any grease or other foreign material. 2. Since this alloy melts at approximately 1470 F, the joint was heated to about 1475 to 1525 F. It must be remembered that no advantage is gained by overheating the joint. A neutral flame was used throughout the entire operation. 3. After the joint has been heated, the tip of the rod is applied to the joint. Since the material flows very readily, it seeps into the crack of the joint to make its bond. The thinner the film, the better the joint.

As in the application of any brazing alloy, care must be taken when applying this phosphorous copper brazing alloy to avoid poor joining of the metals. This will occur only if the alloy is applied below the proper temperature. It should be remembered that the best results are obtained when only the minimum of the alloy is used.

Cover Plates

The neutral bar with its ⅛ in. wall thickness was too thin for butt brazing so cover plates were used to join the bars. These cover plates were ⅛ in. thick by 6 in. long. A cover plate in place may be seen in Fig. 4. In this illustration, which shows the offset construction employed to get through one of the tile walls in the building, the neutral bar with the cover plate in place may be seen at the lower right hand bar. The brazed butt joints are discernible on the lower left hand bar and upper right hand bar while the carbon arc joint is seen at each of the mitered corners.

Jumper Installations

Brazing was the method employed to install jumpers where it was necessary to pass around vertical risers. A typical installation of this sort may be seen in Fig. 3. The jumpers were formed of two pieces of ¼ in. by 3 in. copper bars about 10 in. long. Clamps were used to hold the jumper in alignment during the brazing operation. Referring again to Fig. 3 one of the jumpers can be seen in front of the operator's head.

In Fig. 2 is shown the method used for welding the vertical bars passing from one floor to the floor above. A foot for the vertical bus bars, shown at the bottom of the picture, was fabricated from a ¼ in. by 3 in. copper bar. This bar was brazed to the end of the bus so as to extend about 4 in. beyond the bar on one side. Then a gusset of the same material was brazed to the bus and the base bar to form a foot. The foot of each bus

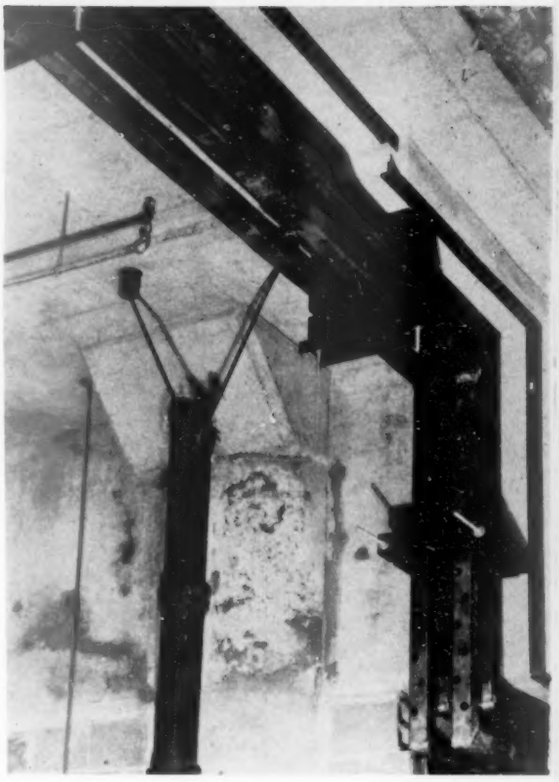


Fig. 4—Frequent offsets were made to get through the walls.

Fig. 3—Jumpers made from ¼ in. by 3 in. copper bars were necessary to pass vertical risers.

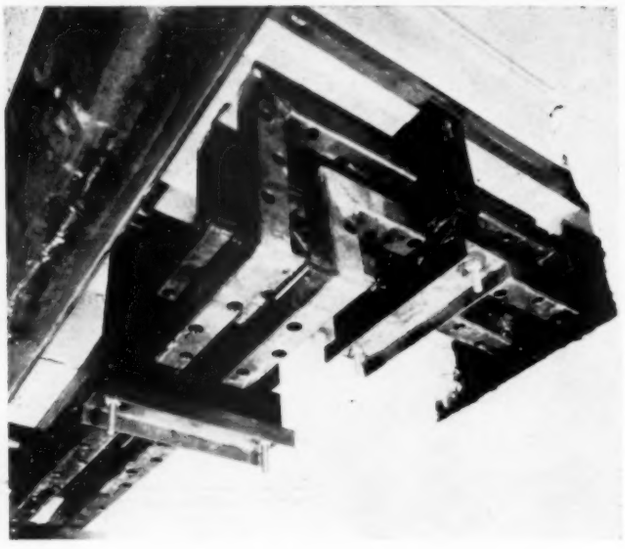


Fig. 5—At some points intricate bends became a part of the bus bar installation.

bar is supported by a common ebonite base.

In running this bus system through the many different rooms of this building, it was found necessary to fabricate some rather intricate bends. In one of these sections one of the really difficult brazing jobs of the entire system was encountered. This point can be seen in Fig. 5 by looking at the opening in the wall where it was necessary to make a joint. On the other side of the wall pictured there was a small closet to house the switchboard for this floor, consequently there was barely room to get a ladder in under the joint.

In Fig. 6 there is shown how one end of a connector is brazed to the end of a bus bar while the other end of the connector is bolted to the switchboard. These bolted connections are the only ones in the entire system and were necessary to provide for an easy means of handling removals or changes at the switchboard or transformer.

Safety Measures

After the installation was completed, each bar received a coating of special paint and then the entire assembly was enclosed in a transite enclosure. The purpose of this enclosure was to safeguard the employees to prevent their coming in contact with the busses and also to hide the bus installation so as to lend a finished appearance to the various rooms despite the extensive bus system throughout the building. If it is found necessary, blowers can be installed at one end of the transite conduit so as to keep the bus bars cool by forced draft circulation.

The completed bus system serves all of the electric requirements of the building, such as, light, currents for motors, test blocks or any other electrical appliances that might be needed from time to time.

THE END

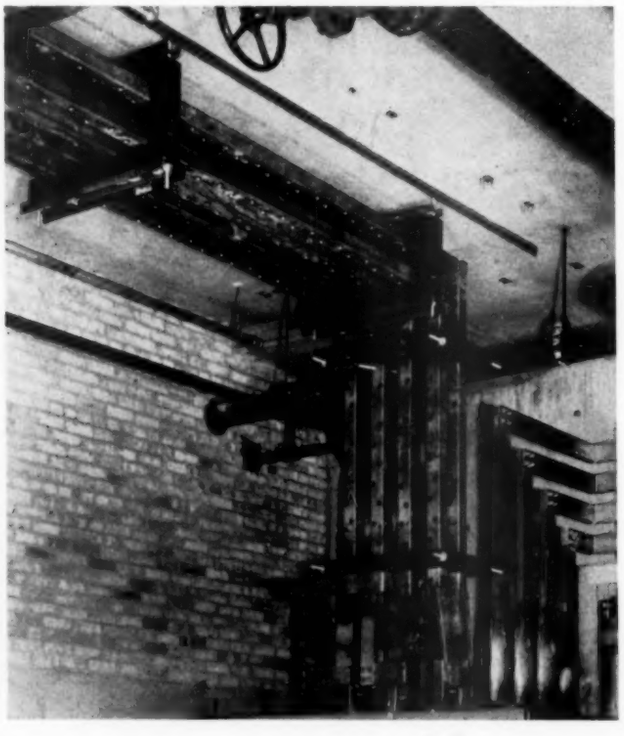


Fig. 6—The only bolted connections were those to the switchboard and transformers.

» «

Bart Says. . . .

Warping can be minimized.

A chain is not stronger than its weakest link by the same token a weld is no better than the weldor doing the job.

Some weldors are always getting into trouble when they are called upon to do welding on thin materials. Many of the new fellows going into the ship yards will find themselves in trouble as soon as they start welding on the deck house.

If they can do a job of welding on heavy plate there must be something wrong with the way they tackle the thinner plates. An analysis of their welding setup may disclose that either one or all of the following "bad practices" cause trouble: (1) Improper joint preparation; (2) welding procedure incorrect; (3) parts improperly clamped; (4) excessive localized heating during welding and (5) shrinkage of deposited weld metal.

Since these are about the only causes of warpage the following corrective measures may be helpful as a means of eliminating or at least correcting this welding fault: (1) See that the parts to be welded are correctly spaced. If the joint edges are hammered thinner than the rest of the plate before welding, warpage will be reduced. This hammering action tends to elongate the edges and the weld shrinkage causes them to pull back to the original shape. (2) Develop the proper welding sequence. Occasionally the step back or skip procedure of welding will reduce warpage. (3) See that the parts are properly clamped adjacent to the joint. (4) Weld rapidly to prevent excess localized heating of the plates adjacent to the weld. Also, use a back up strip so that the parts will cool more rapidly. (5) Warpage will also be reduced if an electrode with high welding speed and moderate penetrating properties is selected.

James T. Barton

FACTS *and figures*

A Statistical Review of the Welding Industry

FACTS AND FIGURES as presented on the following pages is the second annual compilation of the statistics and trends about one of America's fastest growing industries—The Welding Industry.

This feature is one of the annual presentations of *The Welding Engineer* and it is hoped that the information presented will give valuable, authoritative data on an industry so vital to us all. We would appreciate your suggestions and comments with respect to Facts and Figures and would like to know what you wish to see in future statistical reviews of *The Welding Engineer*.

The Publishers

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The Welding Engineer's

STATISTICAL REVIEW

The dollar volume of the Welding Industry in 1941 exceeded 1940 by 50%. The outlook for 1942 indicates even greater gains.

THE activity of the Welding Industry reached to new heights in 1941 but 1942 and 1943 appear to be well on the way to surpassing the industry's business activity of the past year. On the following pages, the Facts and Figures of the Welding Industry definitely indicated this trend.

The dollar volume of business enjoyed by those in the Welding Industry in 1942 exceeded the totals of the first 5 years in the 1930's. This $190,842,728 business represented an increase of 50% over 1940 business. Part of this increase can be attributed to our war industries, most of it, however, is here to stay for many industries have been introduced to welding; once having learned of its advantage they are not going to revert to their previous joining methods. Consequently, the future for the Welding Industry looks very bright and it may be termed one of America's healthiest and fastest growing group of industrial enterprises.

On the pages that follow, the first four are devoted to statistics about defense welding. On January 7th President Roosevelt in his budget message to Congress outlined a program which called for the production of 185,000 warplanes, 120,000 tanks, 55,000 anti-aircraft guns and 18,000,000 tons of merchant shipping during 1942 and 1943 calendar years. Naturally, such a program would mean a great deal to the Welding Industry so an attempt has been made to interpret these extraordinary demands by the President in terms of what they will mean to the industry. Because of certain censorship restrictions it is impossible to give actual figures, so, in most cases the interpretation has been made by comparing the requirements of 1942 and 1943 with those of 1933. By careful study, it may be seen that the requirements for the four defense items mentioned in the President's message exceeded by many times the requirements of the entire industry in 1933.

An idea of the amount of welding that will be involved in building 185,000 warplanes, 120,000 tanks, 55,000 anti-aircraft guns and 18,000,000 tons of merchant shipping during 1942 and 1943 may be obtained by studying "A World of Welding" as shown on page 39. If all of the weld metal deposited in carrying out the President's program was in the form of a 3/8 in. fillet weld, the deposit would extend around the world 8¾ times—217,000 miles of welding! On page 40 there is a comparison of the man hours of weldor and burner time that will be required in connection with this defense program. Page 41 pictorially compares the welding and cutting gas requirements and page 42 the power and electrode requirements.

On page 43 is shown how the dollars were distributed in the Welding Industry from 1937 to 1941. In this graphic view of the welding dollars it can be seen that the growth of the industry has been steady. Naturally, as other industries experienced setbacks in 1938 and 1939 the same was true of the Welding Industry. This should not be taken, however, as an indication that the Welding Industry lost ground. In reality, this was far from the case. The reduction in the dollar volume during this period reflected a change in industrial purchasing policy plus a substantial reduction in the prices of welding machines, equipment and rods between 1937 and 1939. The change in the purchasing policy has been indicated by the trend towards the purchasing of smaller pieces of equipment and multiple operator equipment instead of the larger units in vogue 5 years ago.

How your welding dollar was spent (page 44) presents a picture of how the dollars have been distributed throughout the various phases of this fast growing welding industry. It should be noted that the gases used in the gas welding field are included because they can be readily identified. It is impossible, however, to determine the amounts or sources of power required for arc and resistance welding. For this reason the picture of the manner in which the dollar is divided in the various welding fields may seem distorted but it is as nearly correct as possible.

Since welding is used primarily for the joining and fabricating of steel, steel ingot production has been used as an indication of comparison in many of the graphs appearing in this Statistical Review.

While steel production will also reflect the use of welding it will be seen from page 48 that welding is advancing more rapidly and seeing more new uses than is experienced in the steel industry. In 1941 over 386,000,000 lbs. of welding electrode were produced while the welding wire production exceeded 425,000,000 lbs. This represents an increase of 1762% over 1932 welding wire production while during the same period, the production of steel ingots increased only 622%.

One of the new presentations offered in the second edition of Facts and Figures is devoted to shipbuilding. It is interesting to note the phenomenal growth in the acceptance of welding in the building of ships over 300 ft. in length. Prior to 1936 it will be noted that no ships were constructed in this manner. However, the acceptance has been steady and in 1941 it might be said, technically, that all 94 of the larger vessels completed during the year were of part welded construction. This applies even to those classified in the graphic presentation on page 50 as riveted ships.

Each and every presentation in Facts and Figures indicates that the trend of the Welding Industry is upward. Let us keep our industry climbing to new and greater heights.

WELD YOUR WAY TO VICTORY

Heavy cruisers make a right turn at high speed.

Official U. S. Navy Photo

WHAT { **18,000,000 Tons of Shipping**
120,000 Tanks—185,000 Airplanes
55,000 Anti-Aircraft Guns } **MEAN**

TO THE WELDING INDUSTRY

If the welding on these items of armament was to be only 3/8 in. fillet

welds, the bead would extend 8¾ times around the world.

A World of Welding, Indeed!

WELD YOUR WAY TO VICTORY

Photo by U. S. Army Signal Corps.

Tanks—tons of static power.

WHAT [18,000,000 Tons of Shipping / 120,000 Tanks—185,000 Airplanes / 55,000 Anti-Aircraft Guns] **MEAN**

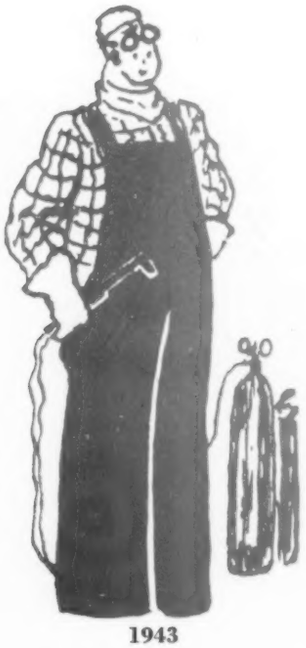
TO THE WELDING INDUSTRY

LABOR

Weldor
man-hours

1933 **1942** **1943**

Burner
man-hours



1933 **1942** **1943**

WELD YOUR WAY TO VICTORY

Official Photo, U. S. Army Air Corps

Future fliers.

WHAT [18,000,000 Tons of Shipping / 120,000 Tanks—185,000 Airplanes / 55,000 Anti-Aircraft Guns] MEAN TO THE WELDING INDUSTRY

Welding and Cutting Gages

Acetylene

1933

1942 **1943**

Oxygen

1933

1942 **1943**

WELD YOUR WAY TO VICTORY

Photo by U. S. Army Signal Corps

Firing 3 in. anti-aircraft guns.

WHAT [18,000,000 Tons of Shipping / 120,000 Tanks—185,000 Airplanes / 55,000 Anti-Aircraft Guns] MEAN

TO THE WELDING INDUSTRY

Power—

Arc and Resistance Requirements

1933

1942 **1943**

Electrodes

1933

1942

1943

The Dollars in the Welding Industry . . . where they went

Resistance Welding Dollars

1937	$ 7,183,293
1938	3,962,814
1939	4,142,985
1940	7,400,916
1941	10,645,149

Gas Welding Dollars

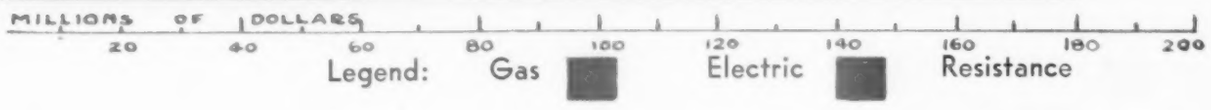
1937	$55,238,527
1938	36,037,286
1939	49,145,540
1940	68,852,284
1941	79,760,483

Electric Welding Dollars

1937	$20,177,345
1938	18,138,634
1939	19,395,977
1940	47,838,020
1941	100,437,096

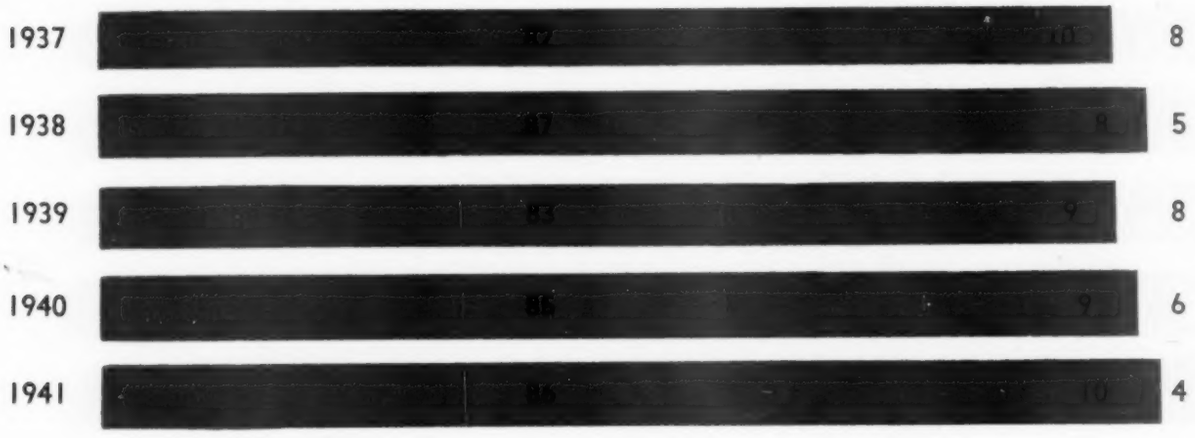
All the Welding Dollars

1937	$ 82,599,165
1938	58,138,734
1939	72,684,502
1940	124,091,220
1941	190,842,728

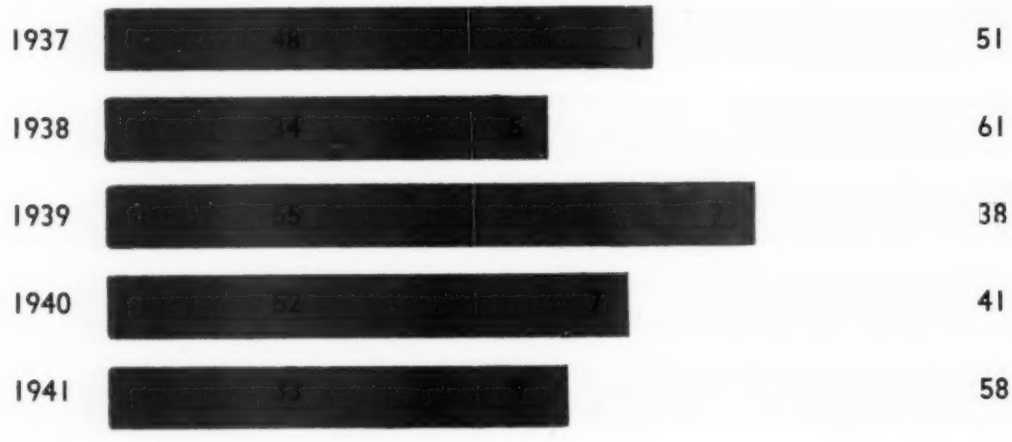


How Each of Your Welding Dollars went....

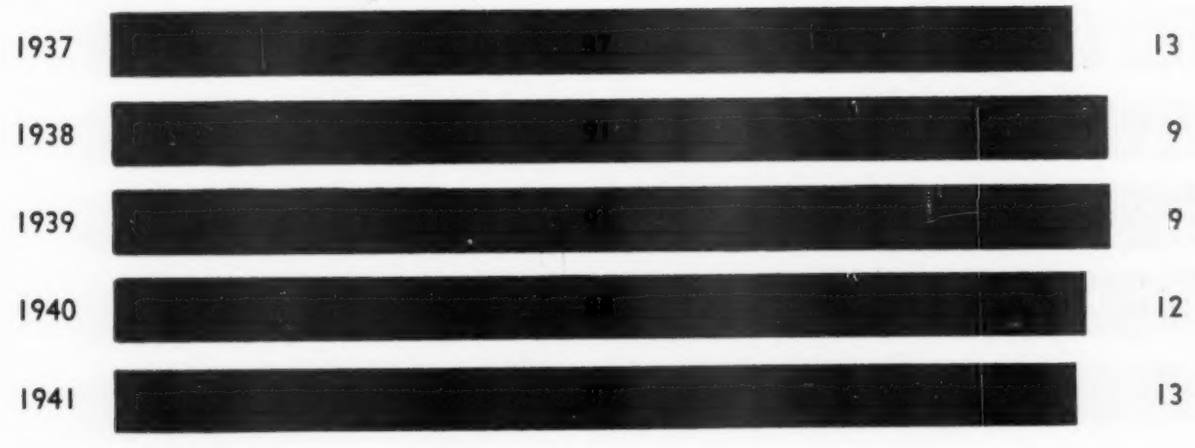
Gas Welding Dollars



Electric Welding Dollars

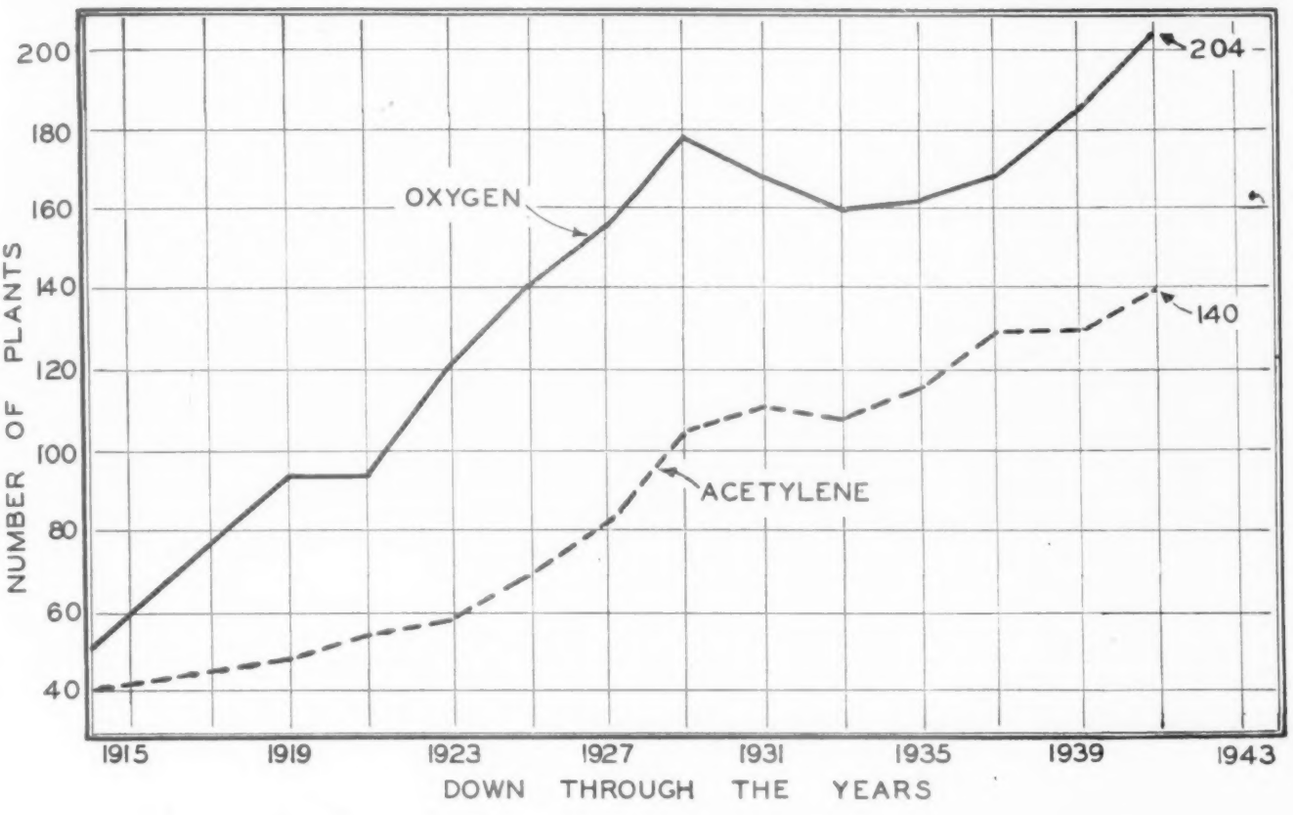


Resistance Welding Dollars

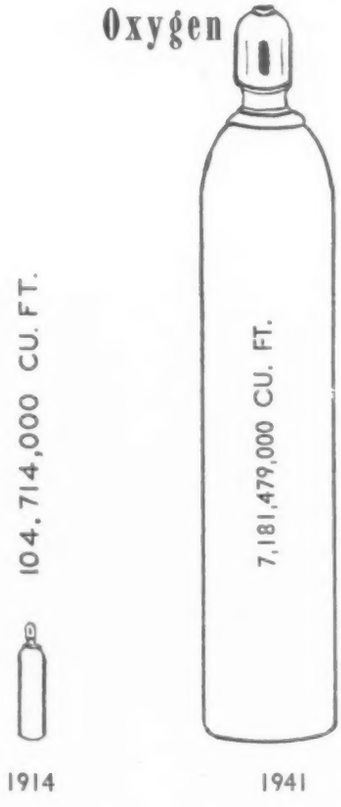


Legend: Gas or Machines | Apparatus | Rods or Electrodes

Oxygen and Acetylene Producing Plant 1914-1941



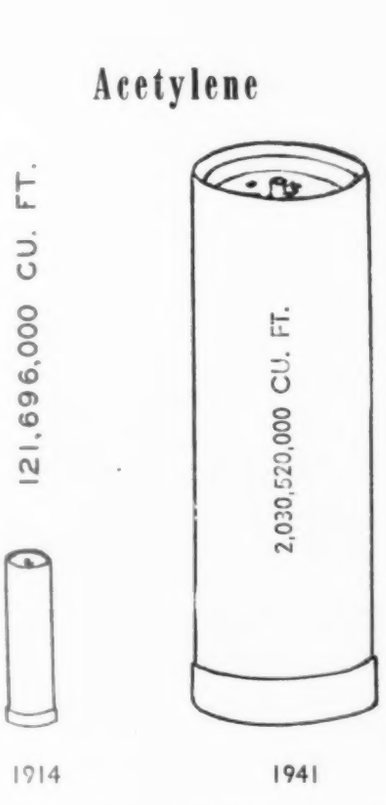
Gas Production . . . how it has increased

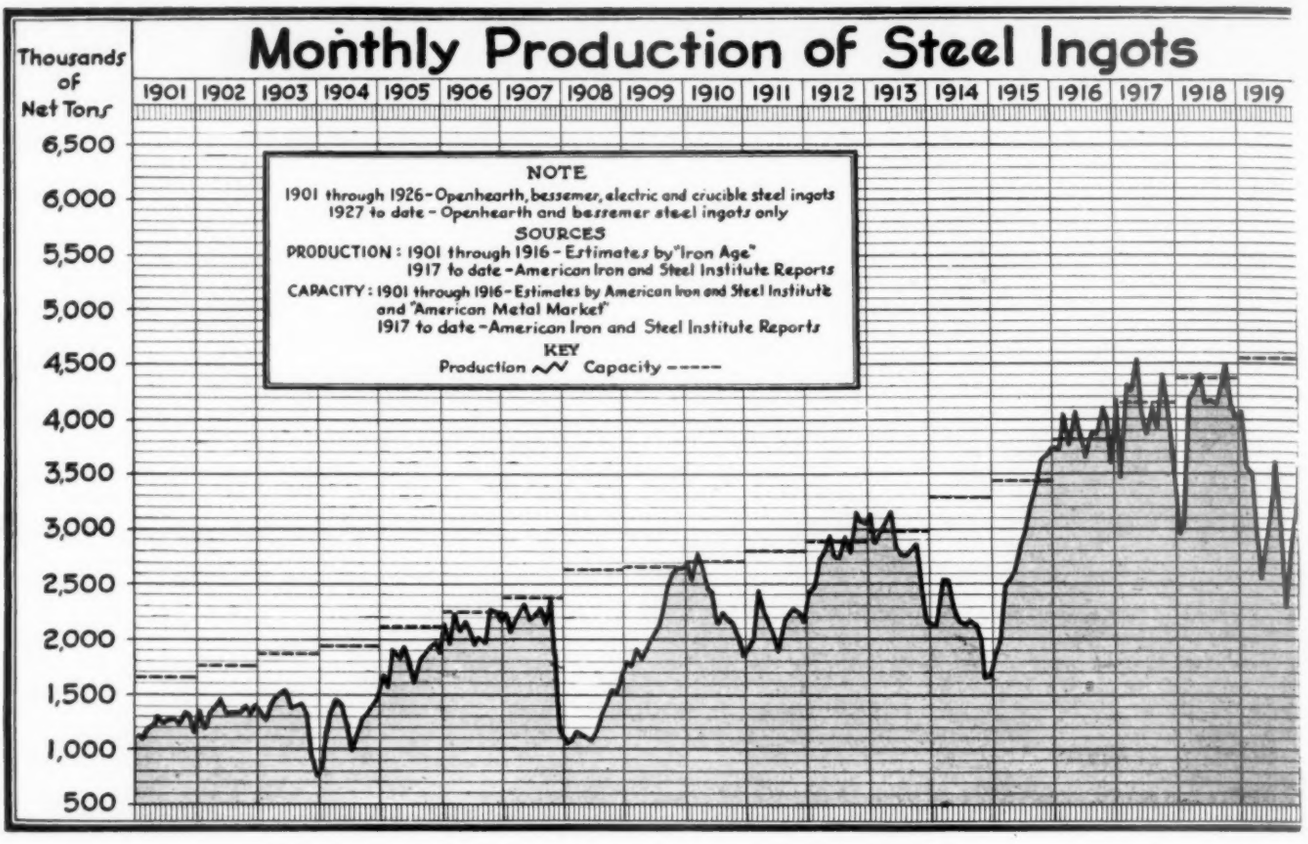


Production

(In 1000 cu. ft.)

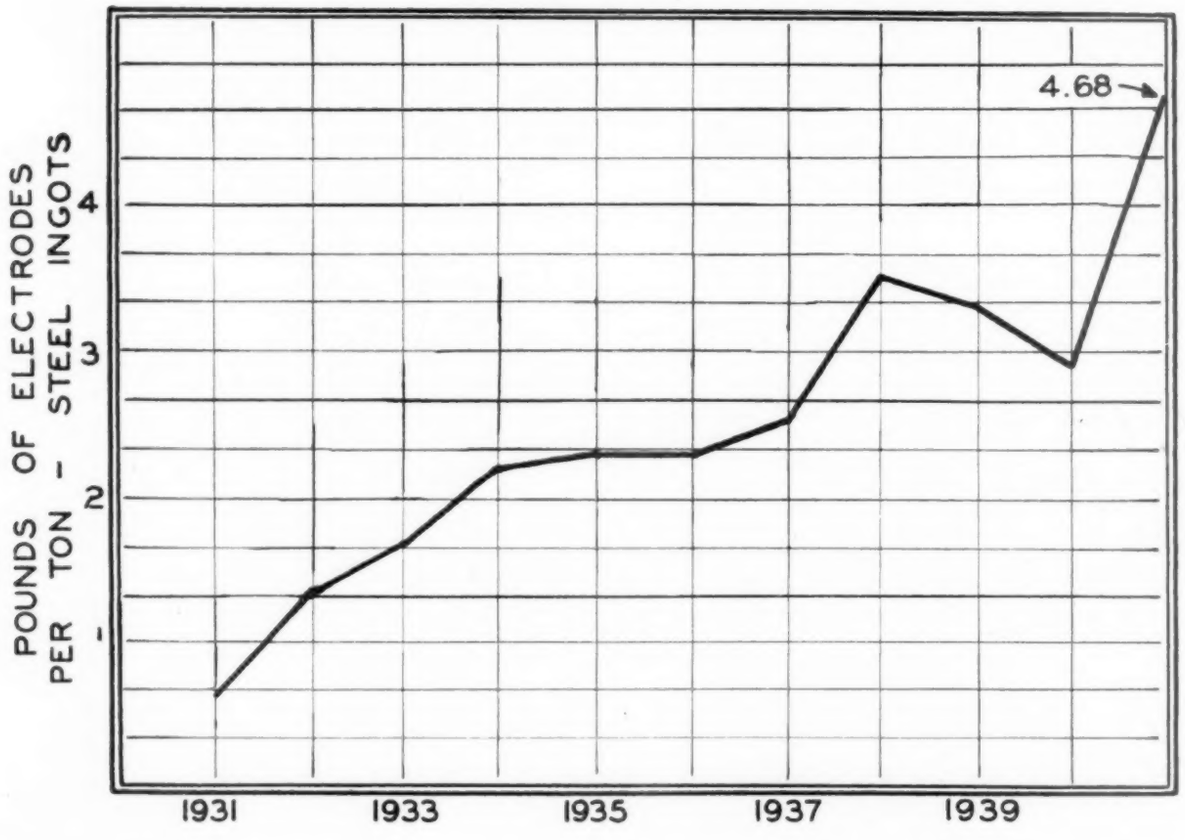
Oxygen	Year	Acetylene
104,714	1914	121,696
1,173,414	1919	311,390
1,062,135	1921	291,630
2,057,526	1923	522,349
2,073,826	1925	525,746
2,359,896	1927	682,481
3,140,095	1929	969,534
2,050,377	1931	742,898
1,821,880	1933	754,089
2,683,859	1935	1,143,199
4,441,391	1937	1,511,445
4,561,968	1939	1,274,164
7,181,479	1941	2,030,520

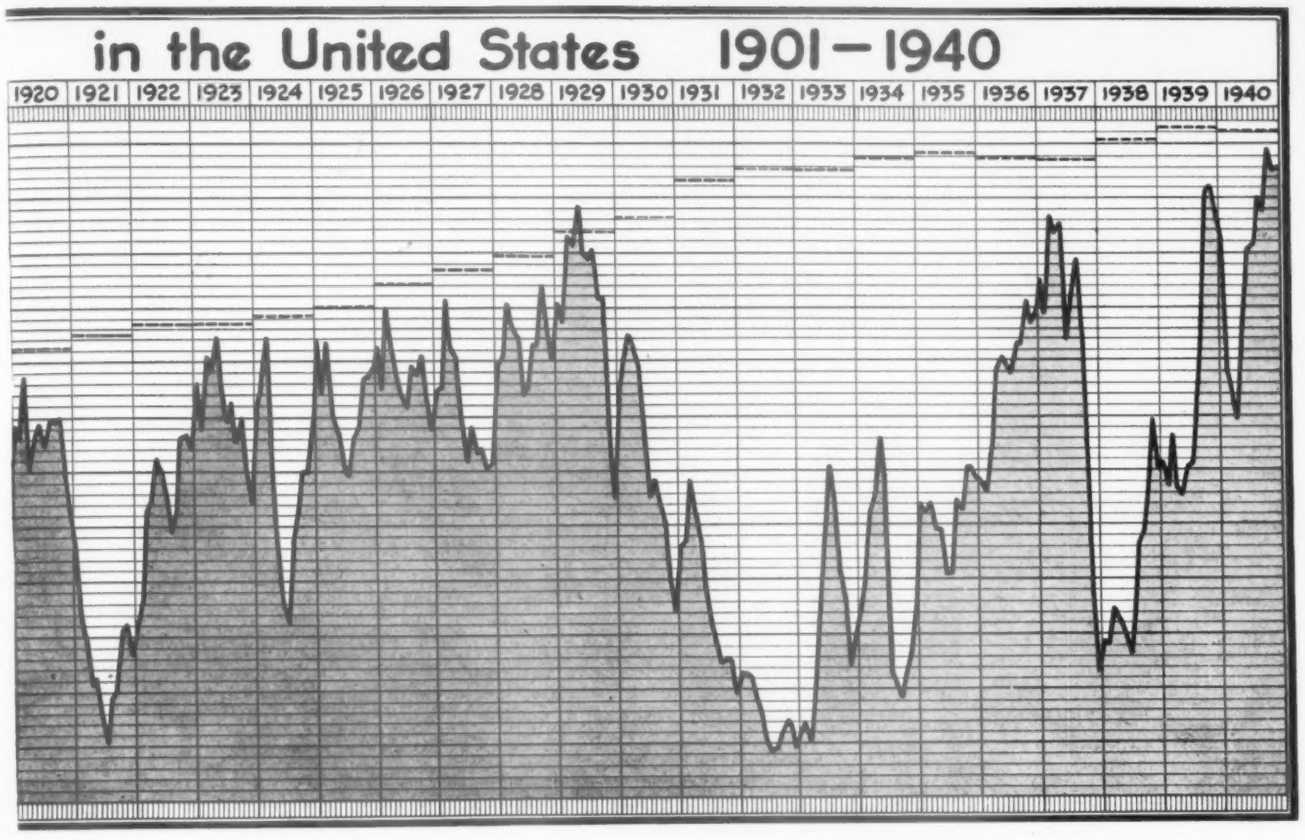



Monthly Production of Steel Ingots
Thousands of Net Tons
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919
NOTE
1901 through 1926 - Openhearth, bessemer, electric and crucible steel ingots
1927 to date - Openhearth and bessemer steel ingots only
SOURCES
PRODUCTION: 1901 through 1916 - Estimates by "Iron Age"
1917 to date - American Iron and Steel Institute Reports
CAPACITY: 1901 through 1916 - Estimates by American Iron and Steel Institute and "American Metal Market"
1917 to date - American Iron and Steel Institute Reports
KEY
Production ~~ Capacity -----

Electrode Production — pounds per ton of Steel Ingot

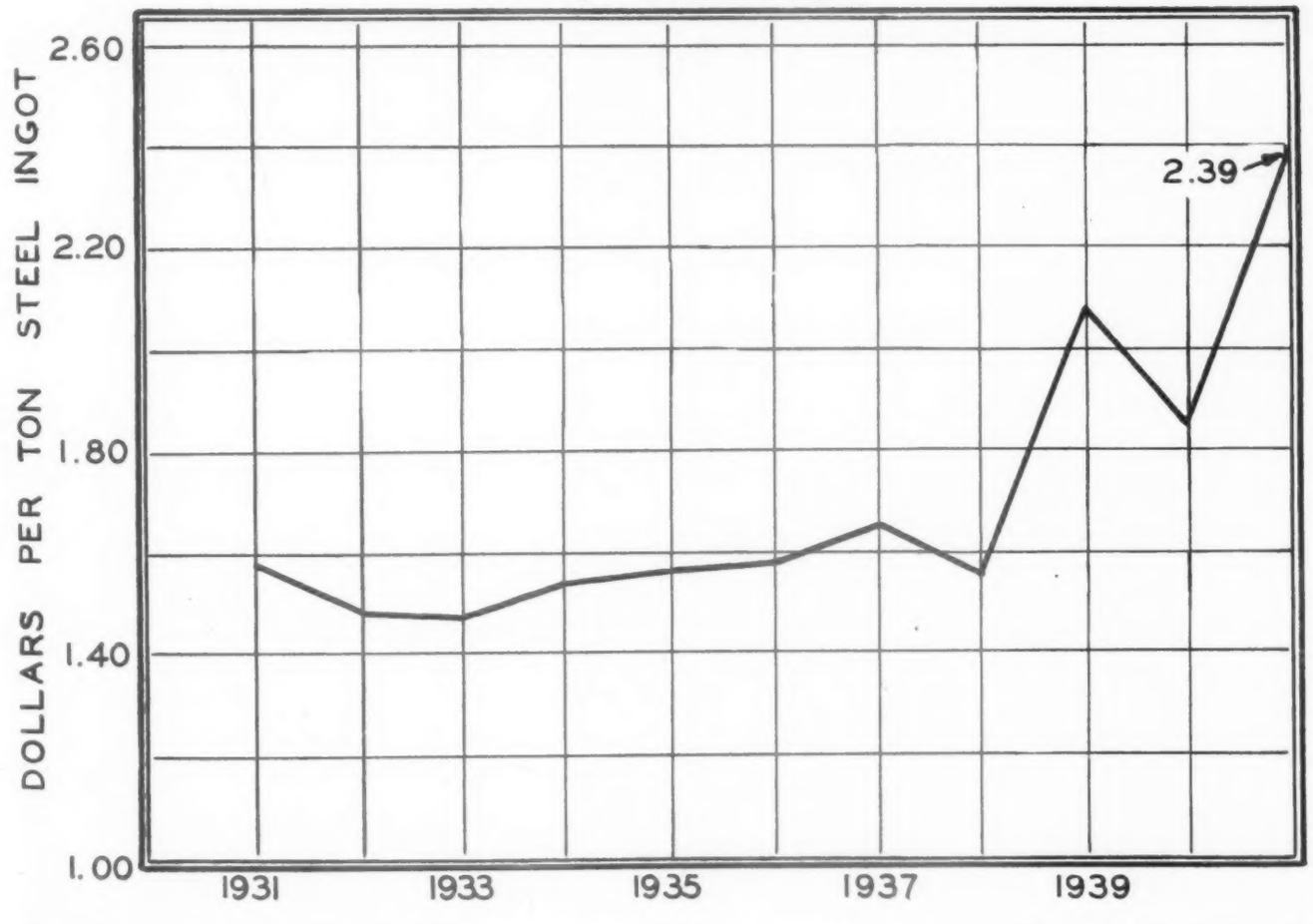
(1931-1941)





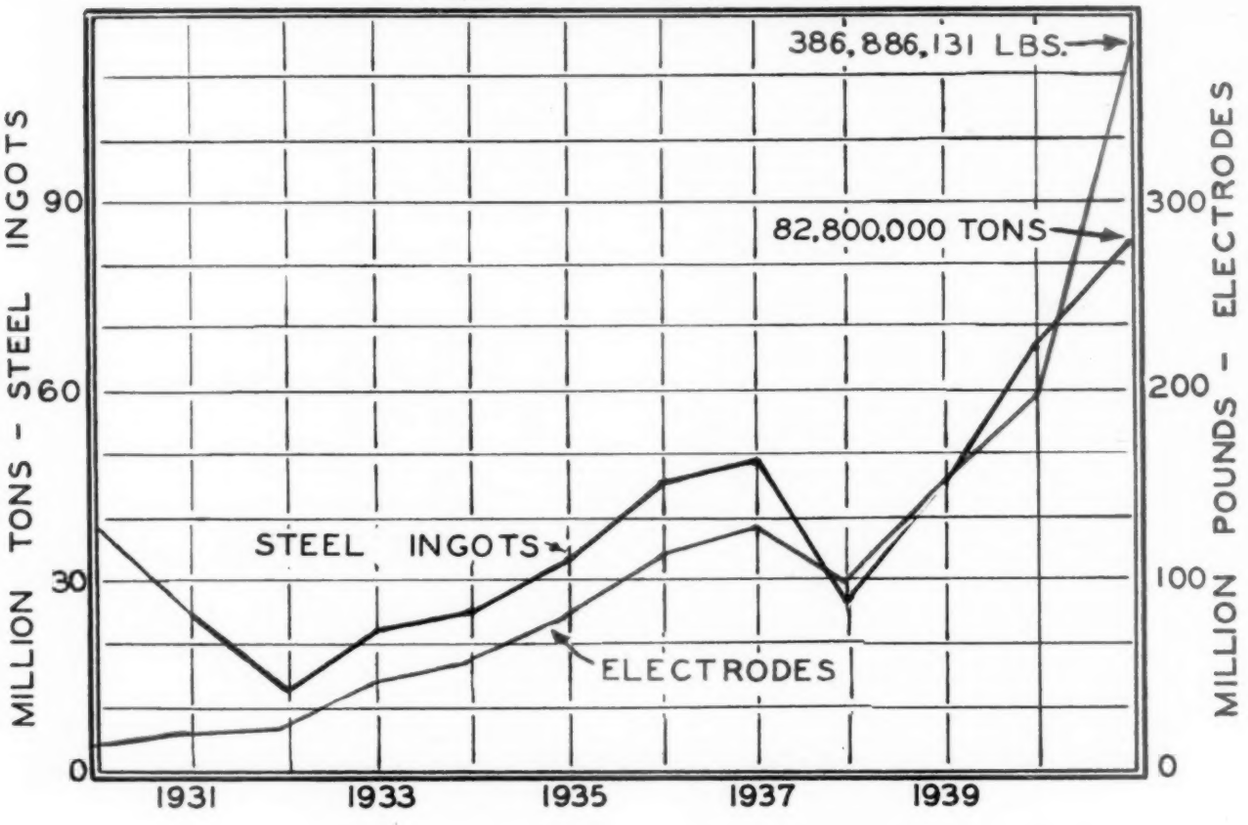
The Welding Market 1931-1941

in dollars per ton of steel ingot.



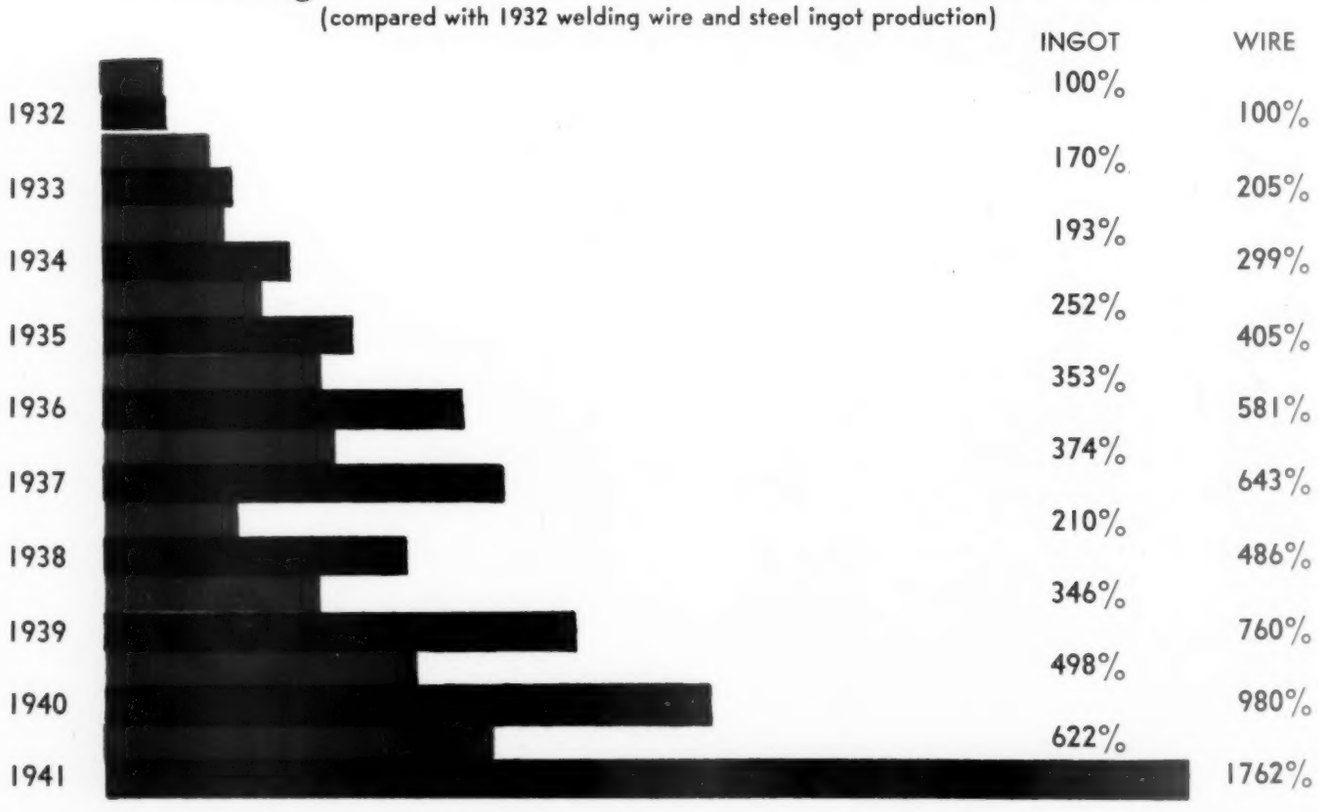
Electrode Production 1931-1941

(compared with steel ingot production)



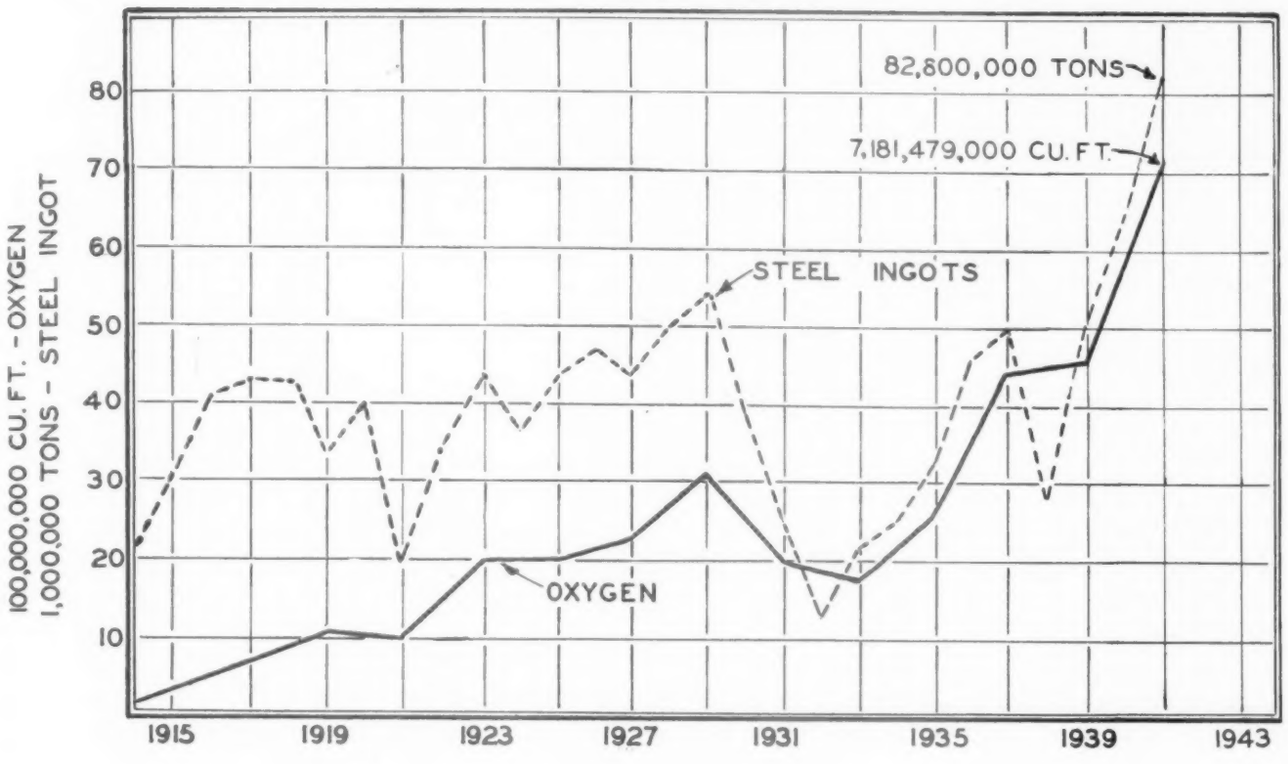
Welding Wire Production 1932-1941

(compared with 1932 welding wire and steel ingot production)



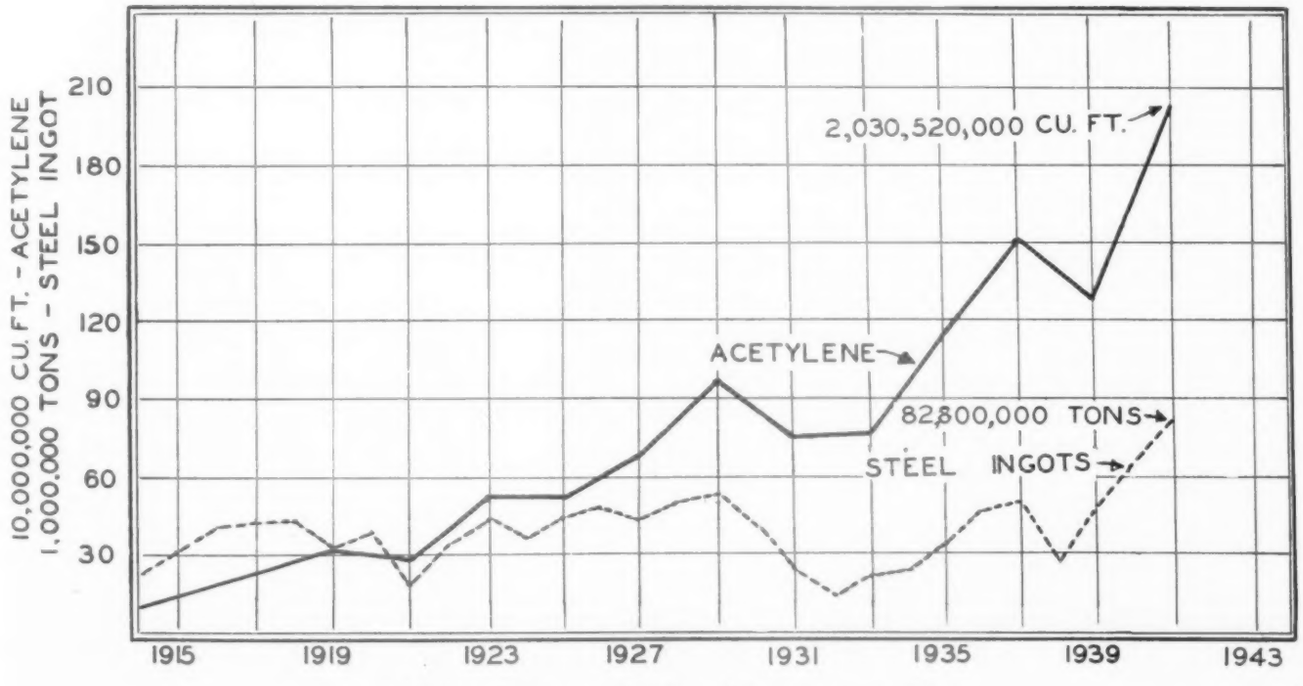
Oxygen Production 1914-1941

in hundred million cubic feet



Acetylene Production 1914-1941

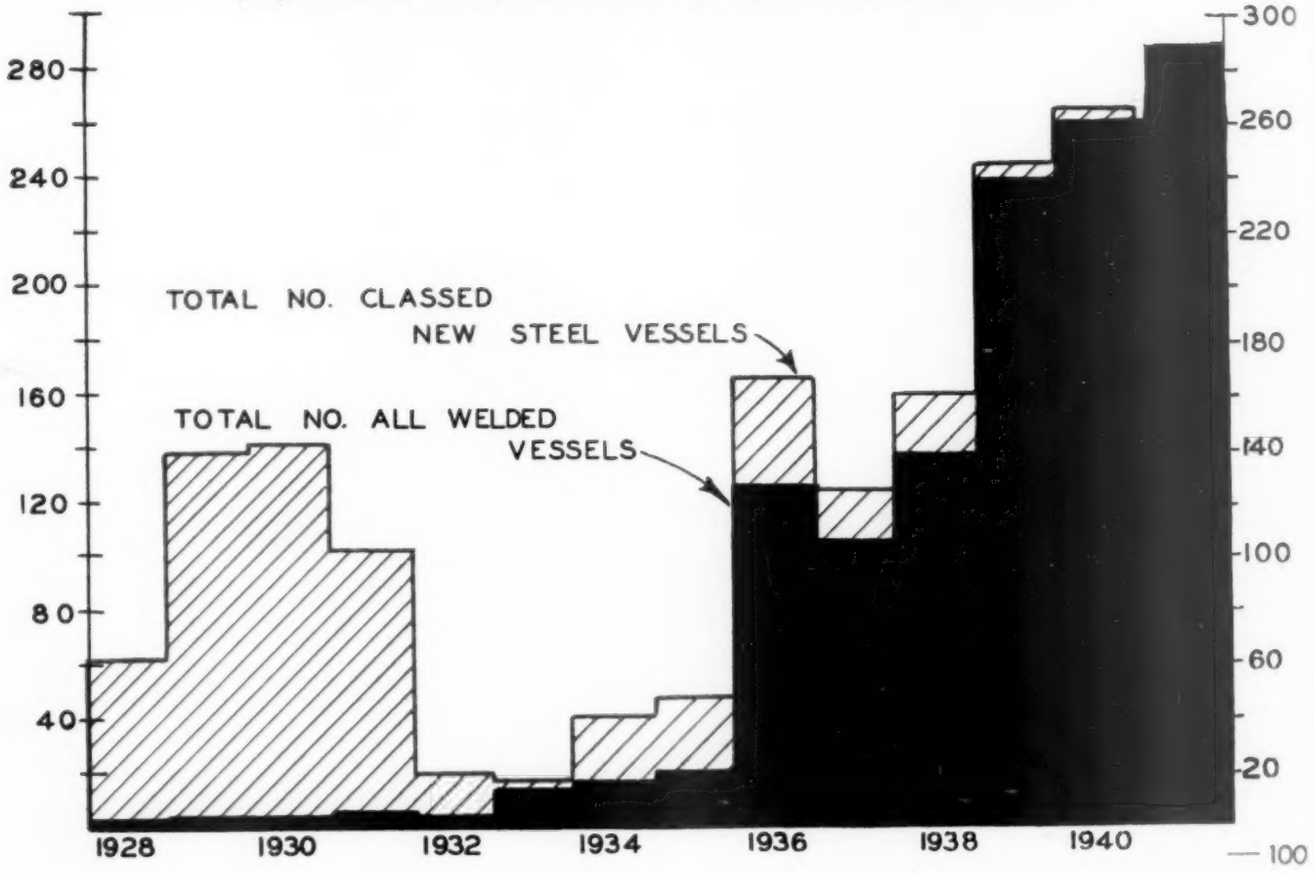
in ten million cubic feet



additional gas production data on page 45

Welded Ship Construction 1928-1941

(Ships under 300 ft. long built to American Bureau of Shipping classification)



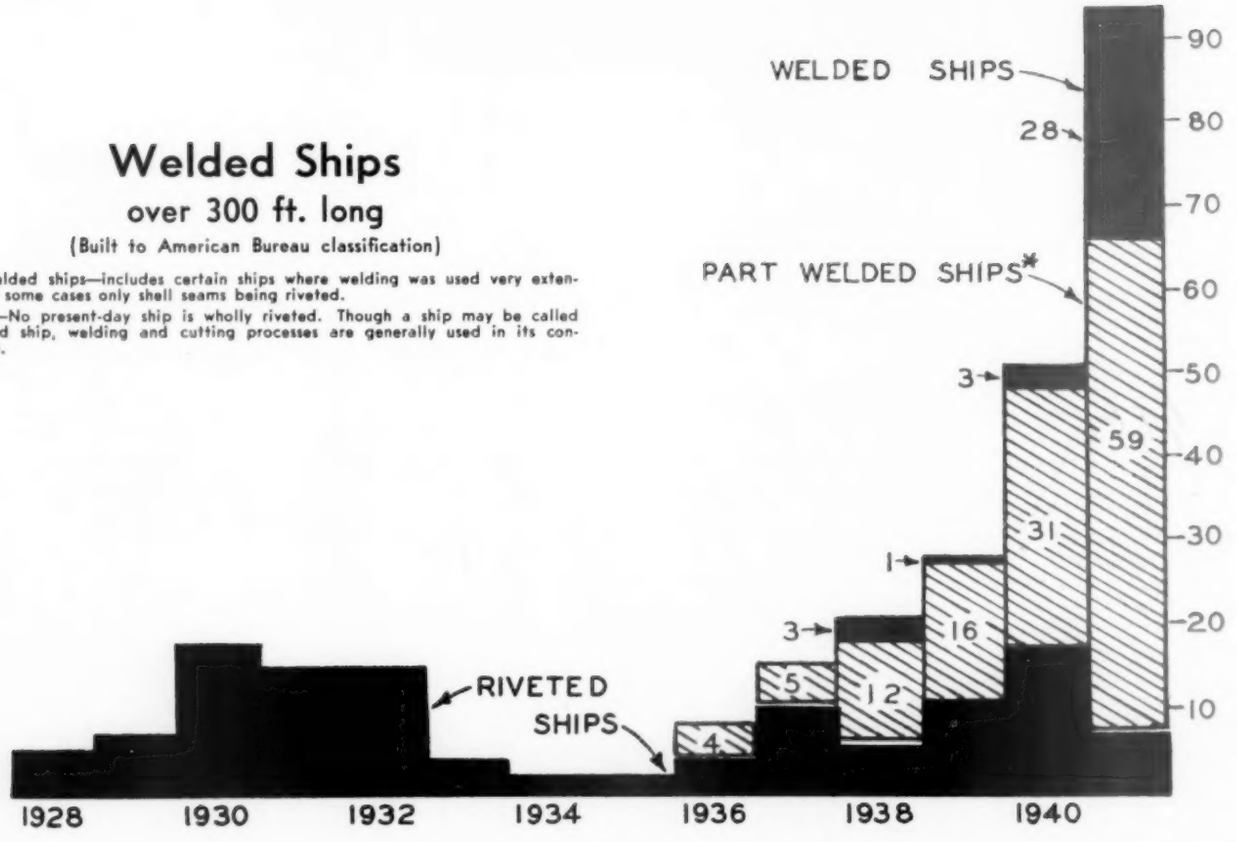
Welded Ships

over 300 ft. long

(Built to American Bureau classification)

*Part welded ships—includes certain ships where welding was used very extensively in some cases only shell seams being riveted.

Note:—No present-day ship is wholly riveted. Though a ship may be called a riveted ship, welding and cutting processes are generally used in its construction.



Figures for the Facts

How the Dollars Went in the Welding Industry

(Page 43)

	1937	1938	1939	1940	1941
Gas Welding Industry and Cutting	$55,238,527	$36,037,286	$49,145,540	$68,852,284	$ 79,760,483
Arc Welding Industry	20,177,345	18,138,634	19,395,977	47,838,020	100,437,096
Resistance Welding Industry	7,183,293	3,962,814	4,142,985	7,400,916	10,645,149
Welding Industry Totals	$82,599,165	$58,138,734	$72,684,502	$124,091,220	$190,842,728

Sources: 1937-39—U. S. Census of Manufacturers
1938-40-41—*The Welding Engineer* Industry Estimates.

How Your Welding Dollar Was Spent

(Page 43)

	1937	1938	1939	1940	1941
Resistance Welding Industry					
Apparatus	$ 7,183,293	$ 3,962,814	$ 4,142,985	$ 7,400,916	$10,645,149
Arc Welding Industry					
Machines	9,808,996	4,258,000	7,293,087	19,744,600	30,952,780
Electrodes	10,130,731	13,553,002	10,736,363	24,886,300	60,514,302
Accessories	237,618 (1)	327,632	1,330,527	3,207,120	8,970,014
Gas Welding Industry—Gas:					
Oxygen	26,072,822	20,899,919	24,015,233	39,989,406	45,673,846
Acetylene	19,166,420	10,452,510	16,466,782	18,535,035	22,834,170
Gas Totals	45,239,242	31,352,429	40,482,015	58,524,441	68,508,016
Apparatus	5,867,688	2,882,989	3,865,065	6,196,706	7,966,048
Welding Rod	4,131,597	1,801,868	4,798,460	4,131,137	3,286,419

(1) Incomplete report.
Source: 1937-39—U. S. Census of Manufacturers
1938-40-41 *The Welding Engineer* Industry Estimates

Oxygen and Acetylene Plants 1914-1940

(Page 45)

	1914	1919	1921	1923	1925	1927	1929
Oxygen	51	94	95	121	141	156	178
Acetylene	40	49	54	58	69	83	104

	1931	1933	1935	1937	1939	1941
Oxygen	168	160	163	170	185	204
Acetylene	111	108	116	130	130	140

Source: 1914-39—U. S. Census of Manufacturers
1941—*The Welding Engineer* Industry Estimates

Steel Ingot Production in the United States 1901-1941

In thousands of tons

(Pages 46-47)

Year	1901	1902	1903	1904	1905	1906
Production	13,156	14,566	14,105	13,530	19,463	22,624
Year	1907	1908	1909	1910	1911	1912
Production	22,559	13,677	23,299	25,154	23,029	30,285
Year	1913	1914	1915	1916	1917	1918
Production	30,280	22,820	31,284	41,402	43,619	43,051
Year	1919	1920	1921	1922	1923	1924
Production	33,695	40,881	19,224	34,568	43,486	36,811
Year	1925	1926	1927	1928	1929	1930
Production	44,141	46,936	43,398	49,865	54,312	39,286
Year	1931	1932	1933	1934	1935	1936
Production	25,193	13,323	22,594	25,599	33,418	46,808
Year	1937	1938	1939	1940	1941	
Production	49,503	27,839	45,769	66,933	82,800	

Sources: 1901-1916—The Iron Age Estimates
1917-1941—American Iron and Steel Institute

Electrode Production 1931-1941

(Page 46)

In Pounds Per Ton of Steel Ingot	
1931	0.6 lbs.
1932	1.4 lbs.
1933	1.7 lbs.
1934	2.2 lbs.
1935	2.3 lbs.
1936	2.3 lbs.
1937	2.5 lbs.
1938	3.5 lbs.
1939	3.3 lbs.
1940	2.9 lbs.
1941	4.6 lbs.

Source: 1931-40—*The Welding Engineer* 1941—*The Welding Engineer* Industry Estimates

» «

The Welding Market 1931-1941

(Page 47)

In Dollars Per Ton of Steel Ingot	
1931	$1.58
1932	1.49
1933	1.47
1934	1.54
1935	1.56
1936	1.58
1937	1.64
1938	2.09
1939	1.55
1940	1.70
1941	2.39

Source: *The Welding Engineer* Industry Estimates

» «

Welded Ships 1928-1941

(Page 50)

Source: American Bureau of Shipping

Welding Wire Production 1932-1941

(Page 48)

	Pounds
1932	24,150,000
1933	49,450,000
1934	72,100,000
1935	97,750,000
1936	140,300,000
1937	155,310,000
1938	117,395,000
1939	183,436,000
1940	237,780,000
1941	425,574,744

Source: 1932-39—American Iron & Steel Institute
1940-41—*The Welding Engineer* Industry Estimates

» «

Acetylene Production 1914-1941

(Page 49)

Source: U. S. Census of Manufacturers 1941—*The Welding Engineer* Industry Estimates

Electrode Production 1931-194[illegible]

(Page 48)

	Pounds
1931	15,827,64[illegible]
1932	18,800,000
1933	39,000,000
1934	57,000,000
1935	77,230,000
1936	110,330,000
1937	128,360,000
1938	97,020,000
1939	152,863,400
1940	198,995,000
1941	386,886,131

Sources: 1931—*The Welding Engineer* Industry Estimates
1932-40—National Electrical Manufacturers' Association
1941—*The Welding Engineer* Industry Estimates

» «

Oxygen Production 1914-1941

(Page 49)

Source: U. S. Census of Manufacturers 1941—*The Welding Engineer* Industry Estimates

» «

ACKNOWLEDGMENT

The Welding Engineer wishes to thank those individual companies and other organizations without whose assistance it would have been impossible to assemble much of the information presented in Facts and Figures. We are especially indebted to the Bureau of Census, American Iron and Steel Institute, Resistance Welder Manufacturers' Association, Compressed Gas Manufacturers' Association, National Electrical Manufacturers' Association and those in the welding industry whose names must remain secret because of the confidential information disclosed.

—The Editor

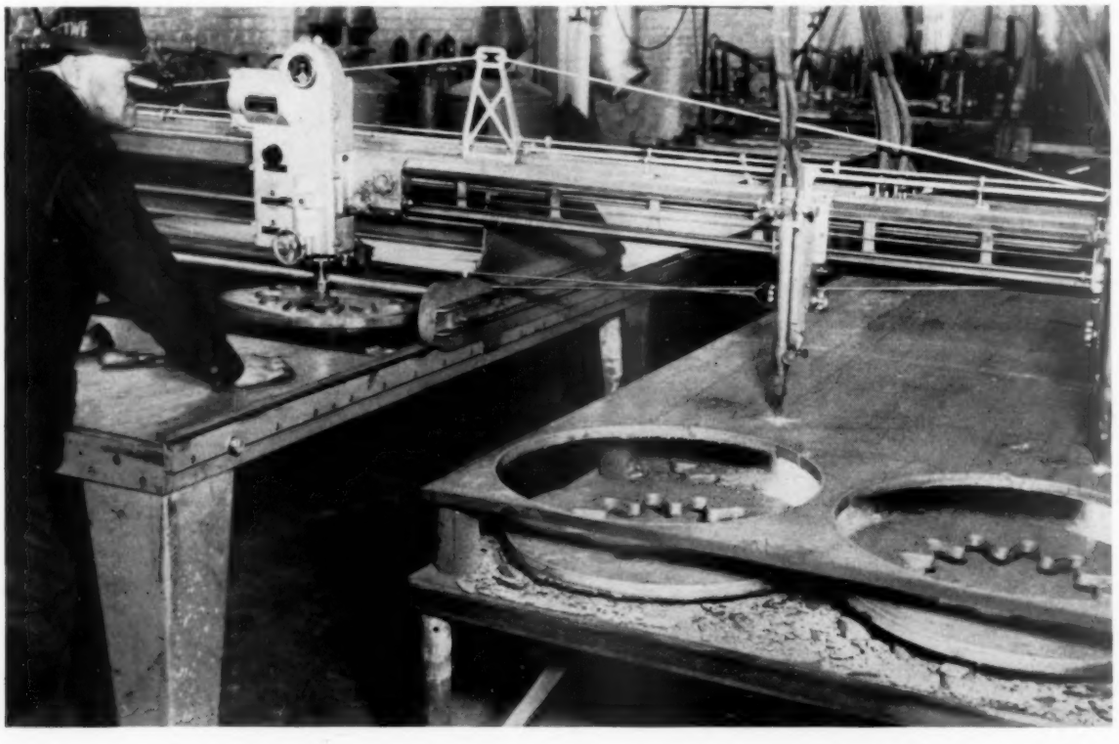


Photo by U.S. Army Signal Corps

Burning Combat Car sprockets from plate stock in the manufacture of armament.

The Welding Engineer

ANNUAL DIRECTORY NUMBER

MARCH, 1942

1. DIRECTORY OF MANUFACTURERS

Who makes over 200 products used everyday in welding and cutting. Look for the noun in the product name; such as "Electrodes, Aluminum," not "Aluminum Electrodes." Company names are classified alphabetically; advertisers in The Welding Engineer are listed in bold face type. The page number accompanying each name is the page on which the company's ad appears.

2. DIRECTORY OF TRADE NAMES

Trade names of equipment and accessories. A brief definition identifies products with the trade names. For details about applications and characteristics see your copy of The Welding Encyclopedia or write the manufacturer direct.

3. CLASSIFIED DIRECTORY OF INDEPENDENT JOBBERS AND DISTRIBUTORS

Where the products can be bought locally from independent jobbers and distributors. This section is arranged alphabetically according to states and cities—for convenience in quickly finding nearest sources of supply.

DIRECTORY OF MANUFACTURERS

Here's where to find out "who makes it" and where manufacturers are located. Look for the noun in the name. For example, on this page is "Appliances, Safety" not "Safety Appliances," "Butt Welders, Resistance," not "Resistance Butt Welders." For convenience each manufacturer's address is repeated with every product listing. Companies listed in bold-face type are advertisers in The Welding Engineer. The page number refers to where their ad appears.

ABRASIVES

Cortland Grinding Wheels Co, Chester, Mass.—p. 109
Macklin Co, Jackson, Mich.—p. 7
Norton Co, Worcester, Mass.
Bay State Abras Prod Co, Westboro, Mass.
Carborundum Co, Niagara Falls, N. Y.
A. P. deSanno & Son, Inc, Phoenixville, Pa.
Safety Grind Wheel & Mach Co, Springfield, Ohio
Simonds Worden White Co, Dayton, Ohio
Sterling Grind Wheel Div, Tiffin, Ohio

ACETYLENE, DISSOLVED

Air Reduction Sales Co, 60 E 42nd St, N. Y. C.—p. 24
Linde Air Prod Co, 30 E 42nd St, N. Y. C. —p. 11, 23
Liquid Carbonic Corp, 3100 S Kedzie, Chicago—p. 111
National Cylinder Gas Co, 205 W Wacker, Chicago—p. 19
Balbach Co, 13th & California, Omaha
Commercial Gas Corp, 286 Carey, Wilkes-Barre, Pa.
Indiana Oxygen Co, 435 S Delaware, Indianapolis
Industrial Oxygen Co, 1377 S 7th St, Louisville, Ky.
Modern Eng Co, Inc, 3401-15 Pine Blvd, St. Louis
Puritan Comp Gas Corp, 2012 Grand, Kansas City, Mo.
Southern Oxygen Co, Arlington, Va.

ALUMINUM ELECTRODES

(See Electrodes, Aluminum)

ALUMINUM WELDING ROD

(See Welding Rod, Aluminum)

ALUMINUM SHEETS AND PLATES

Aluminum Co of America, Pittsburgh
Reynolds Metals Co, Louisville, Ky.
Sheet Aluminum Corp, Jackson, Mich.

APPLIANCES, SAFETY

Acetylene and Oxygen Supply Co, Inc, 30-30 Northern Blvd, Long Island City, N. Y.—p. 126
American Opt Co, Southbridge, Mass.—p. 9
Chicago Eye Shield Co, 2300 Warren Blvd, Chicago—p. 124
Dockson Corp, 3839 Wabash Ave, Detroit, Mich.—p. 98
Eastern Safety Cloth Co, 23 W 60th St, N. Y. C.—p. 126
General Elec Co, Schenectady, N. Y.—p. 20, 21
Kimball Safety Prod Co, 7314 Wade Park Ave, Cleveland—p. 106
Mine Safety App Co, Pittsburgh, Penn.
Safety Cloth & Equip Co, 7016 Euclid, Cleveland—p. 110
Sellstrom Mfg Co, 615 N Aberdeen St, Chicago
Bausch & Lomb Opt Co, Rochester, N. Y.
Boyer-Campbell Co, 6540 St Antoine, Detroit, Mich.
Flood Safety Products Co, 4027 N Drake, Chicago
Pulmosan Safety Equip Co, 176 Johnson, Brooklyn, N. Y.
Standard Safety Equip Co, 232 W Ontario, Chicago, Ill.
Welsh Mfg Co, 177 Nassau, Brooklyn, N. Y.
Willson Prod, Inc, 2nd & Washington, Reading, Pa.

ARC WELDERS, ATOMIC HYDROGEN

General Elec Co, Schenectady, N. Y.—p. 20, 21

ARC WELDERS, AUTOMATIC

Electric Arc, Inc, 152 Jelliff, Newark, N. J.
Lincoln Elec Co, Cleveland—p. 26
Una Welding, Inc, 1615 Collamer, Cleveland, Ohio

ARC WELDERS, ELECTRIC, A.C.

Air Reduction Sales Co (Wilson Welder & Metals Co.) 60 East 42nd N. Y. C.—p. 24
Eisler Engr Co, 756 S 13th, Newark, N J. —p. 127
Electric Arc, Inc, 152 Jelliff Ave, Newark, N. J.
General Elec Co, Schenectady, N. Y.—p. 20, 21
Glenn-Roberts Co, 1009 Fruitvale, Oakland, Cal.—p. 91
Greyhound Elec Mfg Co, Inc, 31 Grand St, Brooklyn, N. Y.—p. 125
Harnischfeger Corp, 4400 W. National, Milwaukee—p. 18
Hercules Elec & Mfg Co, Inc, 2416 Atlantic, Brooklyn—p. 111
Hobart Bros Co, Troy, Ohio—p. 3
Lincoln Elec Co, Cleveland—p. 26
National Cylinder Gas Co (Hollup Corp.), 205 W Wacker, Chicago—p. 19
Shober Sales, Inc, 536 S Aurora, Stockton, Cal.—p. 105
Sight Feed Generator Co, Richmond, Ind. —p. 116
Universal Power Corp, 4300 Euclid Ave, Cleveland, Ohio—p. 124
Welding Eng. Co, 264 Ogden Ave, Milwaukee—p. 16, 17
Westinghouse Elec & Mfg Co, E Pittsburgh—p. 12
Bear Mfg Co, 2020 5th Ave, Rock Island, Ill.
Circle Elec Co, 9 N Columbia, Frankfort, Ind.
Commonwealth Mfg Co, 3200 Oxford, Phila.
Cotter Thermo-Electric Co, 15368 Baylis, Detroit
Electric Welding Machine Co, 9635 French Rd, Detroit
Emerson Elec Mfg Co, 1824 Washington, St. Louis
Ergolyte Mfg Co, 3644 N Lawrence, Philadelphia
Erie Equipment & Mfg Co, 836 E 10th, Erie, Pa.
Giant Grip Mfg Co, Oshkosh, Wis.
Hammett Elec Mfg Co, 209 W 119th Terrace, Kansas City, Mo.
Hampton Elec Mfg Co, 3rd & Archie, Oakmont, Pa.
Ideal Commutator Dresser Co, Sycamore, Ill.
K. O. Lee Co, Aberdeen, S. D.
Larkin Lectro Prod Corp, 220 Taaffe, Brooklyn, N. Y.
Majestic Welder Mfg Co, 2 East 27th, Minneapolis
Marquette Mfg Co, Minneapolis
Mid-States Equip Co, 3127 S Wabash, Chicago
Miller Elec Mfg Co, Inc, 905 N Meade, Appleton, Wis.
Modern Enginr Co, 3411 Pine, St Louis, Mo.
Owen Elec Co, Fayetteville, N. C.
A. O. Smith Corp, Milwaukee
Smith Welding Equip Corp, 2633—4th St, S E, Minneapolis
Trindl Prod Co, 2227 S Calumet, Chicago
Twentieth Century Welder Mfg Co, 6 East 27th, Minneapolis
Una Welding, Inc, 1615 Collamer, Cleveland
U. S. Elec Welder Corp, 1224 W Bancroft, Toledo, Ohio
Victor Welding & Mfg Co, 66 Mangin, N.Y.C.
Welding Apparatus Co, 2750 W Van Buren, Chicago
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Guyan Machinery Co, Box 150, Logan, Va.
Ideal Elec & Mfg Co, E First St, Mansfield, Ohio
F. W. Shrader Co, 5788 Washington, Culver City, Cal.

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Cutler-Hammer, Inc, 315 N 12th St, Milwaukee, Wis.
Electric Controller & Mfg Co, 2700 E 79th, Cleveland
Pier Equip Mfg Co, 502 Cross, Benton Harbor, Mich.
Weltronic Corp, 3080 S Outer Dr, Detroit

BAND SAW WELDERS

Weldex, Inc, 7326 McDonald, Detroit

BENCHES, WELDING

Lyon Metal Prod, Inc, Aurora, Ill.

BOLTS, RESISTANCE WELDING

Ohio Nut & Bolt Co, 600 Front, Berea, Ohio

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John R. Miles, Inc, Prescott, Wis.
Modern Eng Co, Inc, 3401 Pine Blvd, St Louis
John Nageldinger & Son, Inc, 409 E 91st St, N. Y. C.
Smith Welding Equip Corp, 2633—4th St, S E, Minneapolis
Superior Oxy-Acetylene Mach Co, 1102 High St, Hamilton, Ohio
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Electric Weld Mach Co, 9635 French Rd, Detroit
Federal Mach & Welder Co, Warren, Ohio
Micro Prod Co, Peoria, Ill.
Multi-Hydromatic Welding & Mfg Co, 9640 Grinnell, Detroit
National Elect Weld Machines Co, Bay City, Mich.
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Swift Elec. Weld. Co, 6560 Epworth, Detroit
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Ergolyte Mfg Co, 3644 N Lawrence, Philadelphia
Fibre Metal Prod, Chester, Pa.
General Cable Corp, 420 Lexington, N. Y. C.
B. F. Goodrich Co, Akron, Ohio
K. O. Lee & Son Co, Aberdeen, S. D.
Marquette Mfg Co, Inc, Minneapolis
Okonite Co, Passaic, N. J.
John A. Roebling's Sons Co, Trenton, N. J.
Simplex Wire & Cable Co, Cambridge, Mass.
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E. J. Streichert, 1747 N. Crawford, Chicago
John Tillman & Co, 2716 American, Long Beach, Calif.
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Major Eng Wks, Des Moines, Ia.
Marquette Mfg Co, Inc, Minneapolis
O. Z. Elec Mfg Co, 262 Bond, Brooklyn, N. Y.
Progressive Welder Co, 3050 E Outer Dr, Detroit
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Hayes Track App Co, Richmond
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Modern Engrg Co, Inc, 3401 Pine Blvd, St. Louis
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K. O. Lee Co, Aberdeen, S. D.
R. G. LeTourneau, Inc, Peoria, Ill.
Marquette Mfg. Co, Inc, Minneapolis
Mills Alloys, Inc, 11320 Alameda, Los Angeles
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C. E. Phillips Co, 2750 Poplar, Detroit
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Cleveland Tungsten Co, 10200 Meech Ave, Cleveland
Progressive Welder Co, 3050 E Outer Dr, Detroit

Look for the noun
in the
product listing,
for example:
"Electrodes, Nickel"
not
"Nickel Electrodes"

S-M-S Corporation, 1165 Harper, Detroit
Karl Strobel, 4700 Santa Fe, Los Angeles
Taylor-Winfield Corp, Warren, Ohio
Thomson-Gibb Elec. Weld. Co, 161 Pleasant, Lynn, Mass.
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Champion Rivet Co, Harvard & E 108, Cleveland
Ergolyte Mfg. Co, 3644 Lawrence, Philadelphia
K. O. Lee Co, Aberdeen, S. Dak.
Marquette Mfg. Co, Minneapolis
McKay Co, Pittsburgh
Reid-Avery, Dundalk, Baltimore, Md.
John A. Roebling's Sons Co, Trenton, N. J.
Jos. T. Ryerson & Son, Inc, Chicago
Smith Welding Equipment Corp, Minneapolis
Smith Welding Equip. Eastern Corp, Willow Gr., Pa.
Una Welding, Inc, 1615 Collamer, Cleveland
Wickwire-Spencer Steel Co, 500 5th Ave, N. Y. C.

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Carpenter Steel Co, Reading, Pa.
Crucible Steel Co, of America, 405 Lexington Ave, N. Y. C.
Ergolyte Mfg. Co, 3644 N Lawrence, Philadelphia
Marquette Mfg. Co, Minneapolis
Maurath, Inc, 7309 Union, Cleveland

McKay Co, Pittsburgh
Jos. T. Ryerson & Son, Inc, 2558 W 16th, Chicago
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Smith Welding Equip. Eastern Corp, Willow Gr., Pa.
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Maurath, Inc, 7309 Union, Cleveland
C. E. Phillips Co, 2750 Poplar, Detroit
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Flood Safety Prod. Co, 4027 N Drake, Chicago
Larkin Lectro Prod. Corp, 220 Taaffe, Brooklyn, N. Y.
K. O. Lee & Son Co, Aberdeen, S Dak.
Marquette Mfg. Co, Minneapolis
Pulmosan Safety Equip. Co, 176 Johnson, Brooklyn, N. Y.
Jos. T. Ryerson & Son, Inc, Chicago

YOU NEED THIS INFORMATION

. . . In 1942

More Than Ever Before

The victory program requires utmost industrial speed just when tools are hardest to get. Use this Directory as your guide when information on where to get products for welding and cutting is needed in a hurry. It lists both little and well known sources.

Who . . . MAKES IT

Scully Steel Prod. Co, 1319 Wabansia, Chicago
Smith Weld. Equip. Eastern Corp, Willow Grove, Pa.
Una Welding, Inc, 1615 Collamer, Cleveland
Weldit Acetylene Co, 628 Bagley Ave, Detroit
Welsh Mfg. Co, 179 Nassau, Brooklyn
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Buffalo Fire Appliance Corp, Buffalo, N. Y.
C-O-Two Fire Equipment Co, Newark, N. J.
George W. Diener Mfg. Co, Chicago, Ill.
General Fire Truck Corp, Detroit
Johnston & Jennings Co, Cleveland
Kidde, Walter & Co, Inc, Bloomfield, N. J.
Safety Fire Extinguisher Co, N. Y. C.
Stempel Fire Extinguisher Mfg. Co, Philadelphia

FIRST AID KITS

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FITTINGS, TANK

Bonney Forge & Tool, Allentown, Pa.
Crane Co, Chicago
Grinnell Co, Providence, R. I.
Lenape Hydraulic Press. & Forg. Co, Lenape, Penn.
Midwest Piping & Supply, St. Louis
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Who . . . MAKES IT

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Federal Mach. & Welder Co, Warren, Ohio
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National Elec. Weld. Mach. Co, Bay City, Mich.
Progressive Welder Co, 3050 E Outer Dr, Detroit
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Thomson-Gibb Elec. Welding Co, Lynn, Mass.
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Chase Brass & Copper Co, Inc, Waterbury, Conn.
Cortland Weld. Comp. Co, 12-16 Crawford St, Cortland
Craftsweld Equip. Corp, 27-27 Jackson Ave. L. I. City, N. Y.
General Weld. & Equip. Co, 268 Northampton, Boston
Imperial Brass Mfg. Co, 1200 Harrison, Chicago
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Lloyd S Johnson, 2241 Indiana, Chicago
K-G Weld. & Cutting Co, Inc, 519 W 29th, N. Y. C.
Morey Flux & Chem. Co, Wilmington, Del.
New York Weld. Supply Co, 72 Grand St, N. Y. C.
Perry Equip. & Supply Co, 1515 W Thompson, Philadelphia
Peterson Weld. Labor. 450 S Montgall, Kansas City, Mo.
Puritan Compr. Gas Corp, 2012 Grand, Kansas City, Mo.
Special Chem. Corp, 30 Irving Pl, N. Y. C.
Smith Weld. Equip. Corp, 2633—4th St, S E, Minneapolis
Smith Weld. Equip. Eastern Corp, Willow Gr., Pa.
Superior Oxy-Acetylene Mach. Co, 1102 High St, Hamilton, Ohio
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in the
product listing,
such as:
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Jessop Steel Co, Washington, Pa.
K-G Welding & Cutting Co, Inc, 515 W 29th, N. Y. C.
Metallizing Engrg. Co, Inc, 21-07—41st, L. I. City, N. Y.
John R. Miles, Inc, Prescott, Wisc.
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
MotoMeter Division, Electric Auto-Lite Co, 405 Lexington, N. Y. C.
John Nageldinger & Son, Inc, 409 E 91st, N. Y. C.
Puritan Compr. Gas Corp, 2012 Grand, Kansas City, Mo.
Smith Weld. Equip. Corp, 2633—4th St, S E, Minneapolis
Smith Weld. Equip. Eastern Corp, Willow Gr., Pa.
Weldit Acetylene Co, 638 Bagley, Detroit

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Chicago Tool & Engrg. Co, 8394 Chicago, Chicago

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Superior Oxy-Acetylene Mach. Co, 1102 High, Hamilton, Ohio

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Imperial Brass Mfg. Co, 1200 Harrison, Chicago
C. Walker Jones Co, Belfield & Armstrong, Germantown, Phila.
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Modern Eng. Co, 3411 Pine Blvd, St. Louis, Mo.
Montpelier Glove Co, Montpelier, Ind.
Pulmosan Safety Equip. Co, 176 Johnson, Brooklyn, N. Y.
Rabin Glove Co, 407 Grove, Jersey City, N. J.
Jos. T. Ryerson & Son, Inc, Chicago
Smith Welding Equipment Co, St. Paul, Minn.
Smith Welding Equip. Eastern Corp, Willow Grove, Pa.
E. J. Streichert, 1747 N Crawford, Chicago
Weldit Acetylene Co, 638 Bagley, Detroit
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Carter-Lockard Co, 225 W 11th, Los Angeles
Craftsweld Equip. Corp, 2727 Jackson, L. I. City, N. Y.
Ergolyte Mfg. Co, 3644 N Lawrence, Philadelphia
Flood Safety Prod. Co, 4027 N Drake, Chicago
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John R. Miles, Inc, Prescott, Wisc.
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R. G. Haskins Co, 615 S California, Chicago
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Mall Tool Co, 7740 S Chicago Ave, Chicago
Metallizing Engrg. Co, Inc, 21-07—41st Ave, L. I. City, N. Y.
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N. A. Strand & Co, 5001 N Wolcott, Chicago
U. S. Elec. Tool Co, 2488 W 6th, Cincinnati
Walter-Turner Co, East Plainfield, N. J.
Wodack Elec. Tool Corp, 4627 Huron, Chicago

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Chicago Pneumatic Tool Co, 6 E 44th, N. Y. C.
Cleveland Pneumatic Tool Co, Marble & E 77th St, Cleveland
Independent Pneumatic Tool Co, 600 Jackson Blvd, Chicago
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Rotor Tool Co., Cleveland
Jos. T. Ryerson & Son, Inc, 2558 W 16th, Chicago

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Eld Metal Co, Ltd, 1233 E 63rd, Los Angeles
Osage Metal Co, Inc, Oklahoma City, Okla.
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Boyer Campbell Co, 6540 St. Antoine, Detroit
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Fibre-Metal Prod. Co, 3rd & Tilghman, Chester, Pa.
Flood Safety Prods. Co, 4027 N Drake, Chicago
Hammett Elec. Mfg., 209 W. 119th Terrace, Kansas City, Mo.

Who . . . MAKES IT

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Larkin Lectro Prods. Corp, 220 Taaffe Pl., Brooklyn, N. Y.
K. O. Lee & Son Co, Aberdeen, S. D.
Marquette Mfg. Co, Inc, Minneapolis
Pulmosan Safety Equip. Co, 176 Johnson St, Brooklyn
Joseph T. Ryerson & Son, Inc, 2558 W 16th, Chicago
Scully Steel Prod. Co, 1319 Wabansia, Chicago
Smith Welding Equipment Co, St. Paul, Minn.
Smith Weld. Equip. Eastern Corp, Willow Gr., Pa.
Welding Apparatus Co, 2750 Van Buren, Chicago
Weldit Acetylene Co, 628 Bagley, Detroit
Welsh Mfg. Co, 177 Nassau St, Brooklyn, N. Y.
Willson Prod., Inc, 2nd & Washington, Reading, Pa.

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Detroit Electrode Holder Co, Book Tower, Detroit
Electric Welding Machine Co, 9635 French Rd, Detroit
Ergolyte Mfg. Co, 3644 N Lawrence, Philadelphia
Fibre-Metal Prod. Co, 3rd & Tilghman, Chester, Pa.
Grand Specialties Co, 3117 Grand Ave, Chicago
Hammett Elec. Mfg., 209 W 119th Terrace, Kansas City, Mo.
Hampton Elec. Mfg. Co, 3rd & Archie, Oakmont, Pa.
Larkin Lectro Prod. Corp, 220 Taaffe Pl, Brooklyn, N. Y.
K. O. Lee & Son Co, Aberdeen, S. D.
Marquette Mfg. Co, Minneapolis
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
New York Weld. Supply Co, 72 Grand St, N. Y. C.
Scully Steel Prod. Co, 1319 Wabansia, Chicago
Smith Weld. Equip. Corp, 2633—4th St, S E, Minneapolis
Smith Weld. Equip. Eastern Corp, Willow Gr., Pa.
Stoody Co, Whittier, Calif.
U. S. Electric Welder Corp, 1224 W. Bancroft, Toledo, Ohio
Martin Wells, 5886 Compton Ave, Los Angeles

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Hammett Elec. Mfg., 209 W 119th Terrace, Kansas City, Mo.
Larkin Lectro Prod. Corp, 220 Taaffe Pl, Brooklyn, N. Y.
Superior Oxy-Acetylene Mach. Co, 1102 High, Hamilton, Ohio

HOSE, WELDING & CUTTING

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Boston Woven Hose & Rubber Co, Cambridge, Mass.
Electric Hose & Rubber Co, Wilmington, Del.
B. F. Goodrich Co, Akron, Ohio
Goodyear Tire & Rubber Co, Akron, Ohio
Hewitt Rubber Co, Buffalo, N. Y.
Imperial Brass Mfg. Co, 1200 Harrison, Chicago
John R. Miles, Inc, Prescott, Wisc.
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
John Nageldinger & Son, Inc, 409 E 91st, N. Y. C.
Smith Weld Equip. Corp, 2633—4th St, S E, Minneapolis
U. S. Rubber Co, N. Y. C.

HYDROGEN, COMPRESSED

Air Reduction Sales Co, 60 E 42nd, N. Y. C. —p. 24
Linde Air Prod. Co, 30 E 42nd, N. Y. C.—p. 11, 23
Wall Chemical Div, Liquid Carbonic Corp, Chicago—p. 111
Puritan Compr. Gas Corp, 2012 Grand, Kansas City, Mo.
Southern Oxygen Co, Arlington, Va.

ILLIUM, SHEETS AND PLATES

Burgess-Parr Co, Freeport, Illinois

INDICATOR, FLAMMABLE GAS

Mine Safety Appliances Co, Pittsburgh

INSPECTION EQUIPMENT, WELD

(See Also Testing Equipment)

Acro Welder Mfg. Co, 1825 W St. Paul, Milwaukee—p. 115
Air Reduction Sales Co, 60 E 42nd, N. Y. C. —p. 24
Electric Arc, Inc, 152 Jelliff, Newark, N. J.
Linde Air Products Co, 30 E 42nd, N. Y. C. —p. 11, 23
Metal & Thermit Corp, 120 Broadway, N. Y. C.—p. 4
Rubicon Co, Ridge & 35th, Philadelphia—p. 120
Chicago Tool & Engrg. Co, 8389 S Chicago Ave, Chicago
Fibre Metal Prod. Co, 3rd & Tilghman, Chester, Pa.
Magnaflux Corp, 25 W 43rd, N. Y. C
General Electric X-Ray Corp, 2012 Jackson, Chicago
Westinghouse X-Ray Div, 2519 Wilkens, Baltimore, Md.

INSTRUMENTS, TRAINING AIDS

Harris Calorific Co, 5501 Cass, N W, Cleveland—p. 6
Rubicon Co, Ridge at 35th, Philadelphia—p. 120
A. O. Smith Corp, Milwaukee

JIGS, PIPE WELDING

Jewel Mfg. Co, 1841 University, St. Paul, Minn.—p. 122

LEAD-BURNING EQUIPMENT

(See Torches, Welding)

LENS CLEANER

American Optical Co, Southbridge, Mass.—p. 9
Dockson Corp, 3839 Wabash, Detroit—p. 98
Sellstrom Mfg. Co, 615 N Aberdeen, Chicago
Bausch & Lomb Optical Co, Rochester, N. Y.
Carhoff Co, 3050 Kensington, Cleveland, O.
John C. Dolph, 170 A Emmett, Newark, N. J.
Univis Lens, 410 Leo, Dayton, O.

LENSES, COVER

Acetylene and Oxygen Supply Co, Inc, 30-30 Northern Blvd, L. I. City, N. Y.—p. 126
Air Reduction Sales Co, 60 E 42nd, N. Y. C. —p. 24
American Optical Co, Southbridge, Mass. —p. 9
Arcos Corp, 401 N Broad St, Philadephia—Inside Back Cover
Chicago Eye Shield Co, 2300 Warren Blvd, Chicago—p. 124
Dockson Corp, 3839 Wabash, Detroit—p. 98
Electric Arc, Inc, 152 Jelliff, Newark, N. J.
F. R. Faulk, 405 Penn Ave, Pittsburgh—p. 125
General Elec. Co, Schenectady, N. Y.—p. 20, 21
Greyhound Elec. Mfg. Co, Inc, 31 Grand St, Brooklyn—p. 125
Hobart Bros. Co, Troy, Ohio—p. 3
Ideal Face Shield Co, 468 N Garfield, Columbus, Ohio—p. 127
Jackson Products, 3265 Wight St, Detroit—Front Cover
Kimball Safety Prod. Co, 7314 Wade Pk Ave, Cleveland—p. 106
Lincoln Elec. Co, Cleveland—p. 26
Linde Air Prod. Co, 30 E 42nd, N. Y. C.—p. 11, 23
Mine Safety Appliances Co, Pittsburgh
National Cylinder Gas Co, 205 W Wacker, Chicago—p. 19
Northeast Metals Co, 4124 Torresdale Ave, Philadelphia—p. 126
Safety Cloth. & Equip. Co, 7016 Euclid, Cleveland—p. 110
Sellstrom Mfg. Co, 615 N Aberdeen, Chicago
Steel Sales Corp, 3348 S Pulaski, Chicago—p. 109
Universal Power Corp, 4300 Euclid, Cleveland—p. 124
Welding Alloys Mfg. Co, 744 Broad St, Newark, N. J.—p. 126
Welding Engrg. Co, 264 E Ogden, Milwaukee—p. 16, 17
Westinghouse Elec. & Mfg. Co, E Pittsburgh—p. 12
American Agile Corp, 5806 Hough, Cleveland
Bausch & Lomb Optical Co, Rochester, N. Y.
Craftsweld Equip. Corp, 2727 Jackson, L. I. City, N. Y.
Ergolyte Mfg. Co, 3644 N Lawrence, Philadelphia
Fibre-Metal Prod. Co, 3rd & Tilghman, Chester, Pa.
Fish-Schurman Corp, 250 E 43rd, N. Y. C.
Larkin Lectro Prod. Corp, 220 Taaffe Pl, Brooklyn
John R. Miles, Inc, Prescott, Wisc.
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
Pulmosan Safety Equip. Co, 176 Johnson St, Brooklyn
Una Welding, Inc, 1615 Collamer, Cleveland
Univis Lens, 410 Leo, Dayton, Ohio
Welsh Mfg. Co, 177 Nassau St, Brooklyn
Willson Products, Inc, 2nd & Washington, Reading, Pa.

LENSES, WELDING

Acetylene and Oxygen Supply Co, Inc, 30-30 Northern Blvd, L. I. City, N. Y.—p. 126
Air Reduction Sales Co, 60 E 42nd, N. Y. C. —p. 24
American Optical Co, Southbridge, Mass.—p. 9
Arcos Corp, 401 N Broad St, Philadelphia—Inside Back Cover
Chicago Eye Shield Company, 2300 Warren Blvd, Chicago—p. 124
Dockson Corp, 3839 Wabash, Detroit—p. 98
Electric Arc, Inc, 152 Jelliff, Newark, N. J.
F. R. Faulk, 405 Penn Ave, Pittsburgh—p. 125
General Elec. Co, Schenectady, N. Y.—p. 20, 21
Greyhound Elec. Mfg. Co, Inc, 31 Grand St, Brooklyn—p. 125
Hobart Bros. Co, Troy, Ohio—p. 3
Ideal Face Shield Co, 468 N Garfield, Columbus, Ohio—p. 127
Jackson Products, 3265 Wight, Detroit—Front Cover
Kimball Safety Prod. Co, 7314 Wade Pk Ave, Cleveland—p. 106
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Linde Air Prod. Co, 30 E 42nd, N. Y. C.—p. 11, 23
Mine Safety Appliances Co, Pittsburgh
National Cylinder Gas Co, 205 W Wacker, Chicago—p. 19
Safety Cloth. & Equip. Co, 7016 Euclid, Cleveland—p. 110
Sellstrom Mfg. Co, 615 N Aberdeen, Chicago
Universal Power Corp, 4300 Euclid, Cleveland—p. 124
Welding Alloys Mfg. Co, 744 Broad St, Newark, N. J.—p. 126
Welding Engrg. Co, 264 E Ogden, Milwaukee—p. 16, 17
Westinghouse Elec. & Mfg. Co, E Pittsburgh—p. 12
American Agile Corp, 5806 Hough, Cleveland
Bausch & Lomb Opt. Co, Rochester, N. Y.
Craftsweld Equip. Corp, 2727 Jackson, L. I. City, N. Y.
Eastern Weld. Equip. Co, 17 W 60th, N. Y. C.
Ergolyte Mfg. Co, 3644 N Lawrence, Philadelphia
Fibre-Metal Prod. Co, 3rd & Tilghman, Chester, Pa.
Fish-Schurman Corp, 250 E 43rd, N. Y. C.
Larkin Lectro Prod. Corp, 220 Taaffe Pl, Brooklyn
John R. Miles, Inc, Prescott, Wis.
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
Pulmosan Safety Equip. Co, 176 Johnson St, Brooklyn
Smith Welding Equipment Corp, St. Paul, Minn.
Smith Weld. Equip. Eastern Corp, Willow Gr., Pa.
Una Welding, Inc, 1615 Collamer, Cleveland
Univis Lens, 410 Leo, Dayton, Ohio
Welsh Mfg. Co, 177 Nassau St, Brooklyn
Willson Prod., Inc, 2nd & Washington, Reading, Pa.

LIGHTERS, TORCH

Air Reduction Sales Co, 60 E 42nd, N. Y. C.—p. 24
Flint Prod. Co, 2923 Avenue H, Brooklyn, N. Y.—p. 111
Greyhound Elec. Mfg. Co, Inc, 31 Grand St, Brooklyn—p. 125
Linde Air Prod. Co, 30 E 42nd St, N. Y. C.—p. 11, 23
National Cylinder Gas Co, 205 W Wacker, Chicago—p. 19
Safety Gas Lighter Co, Lynn, Mass.—p. 120
Shoot-A-Lite Corp, 118 E 28th St, N. Y. C.—p. 125
Universal Power Corp, 4300 Euclid, Cleveland—p. 124
Welding Engrg. Co, 264 E Ogden, Milwaukee—p. 16, 17
Craftsweld Equip. Corp, 2727 Jackson, L. I. City, N. Y.
G. C. Fuller Co, 4027 N Drake, Cincinnati, Ohio
Imperial Brass Mfg. Co, 1200 W Harrison St, Chicago
John R. Miles, Inc, Prescott, Wis.
Modern Engrg. Co, St. Louis, Mo.
Puritan Compr. Gas Corp, 2012 Grand, Kansas City, Mo.
Smith Weld. Equip. Corp, 2633—4th St, S E, Minneapolis

LIGHTS, CARBIDE

Air Reduction Sales Co, 60 E 42nd, N. Y. C.—p. 24
Linde Air Prod. Co, 30 E 42nd St, N. Y. C.—p. 11, 23
Alexander Milburn Co, Baltimore, Md.—p. 102
National Carbide Corp, 60 E 42nd—N. Y. C.—p. 119
National Cylinder Gas Co, 205 W Wacker, Chicago—p. 19
Sight Feed Generator Co, Richmond, Ind.—p. 116

LUGS, WELDING CABLE
(See Connectors, Cable)

MANIPULATORS, WELDING
(See Positioners, Welding)

MAGNESIUM, SHEETS AND PLATES

American Magnesium Corp, Cleveland
Dow Chemical Co, Midland, Mich.

MANGANESE NICKEL APPLICATOR BARS & WEDGES

American Manganese Steel Div, Chicago Heights, Ill.—p. 93
Electric Arc, Inc, 152 Jelliff, Newark, N. J.
Steel Sales Corp, 3348 S Pulaski, Chicago—p. 109
Stulz-Sickles Corp, 91 N. J. Railroad Ave, Newark, N. J.—p. 113
Taylor-Wharton Iron & Steel Co, Easton, Pa.—p. 84

MANGANESE NICKEL ELECTRODES
(See under Electrodes)

MANIFOLDS, OXYGEN & ACETYLENE

Air Reduction Sales Co, 60 E 42nd, N. Y. C.—p. 24
Bastian Blessing Co, 4201 Peterson, Chicago—p. 121
Dockson Corp, 3839 Wabash, Detroit—p. 98
Harris Calorific Co, 5501 Cass N W, Cleveland—p. 6
Linde Air Prod. Co, 30 E 42nd, N. Y. C.—p. 11, 23
Liquid Carbonic Corp, 3100 S Kedzie, Chicago—p. 111
Alexander Milburn Co, Baltimore, Md.—p. 102
National Cylinder Gas Co, 205 W Wacker, Chicago—p. 19
Victor Equip. Co, San Francisco—p. 14, 89
Craftsweld Equip. Corp, 2727 Jackson, L. I. City, N. Y.
Eastern Weld. Equip. Co, 17 W 60th, N. Y. C.
Imperial Brass Mfg. Co, 1200 Harrison, Chicago
John R. Miles, Inc, Prescott, Wis.
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
John Nageldinger & Son, Inc, 409 E 91st, N. Y. C.
Smith Weld. Equip. Corp, 2633—4th, S E, Minneapolis
Weldit Acetylene Co, 636 Bagley, Detroit

METAL SPRAYING EQUIPMENT

Alexander Milburn Co, Baltimore, Md.—p. 102
Metallizing Co of America, 562 W Washington Blvd, Chicago, Illinois
Metallizing Co of America, Inc, 1351 E 17th Los Angeles
Metallizing Engrg. Co, Inc, 21-07—41st Ave, L. I. City, N. Y.
Metals Coating Co of America, 495 No 3rd, Philadelphia

METAL SPRAYING HOODS
(See Appliances, Safety)

MONEL ELECTRODES & WELDING RODS
(See under Electrodes and Welding Rods)

NECKS & NOZZLES, WELDING
(See Fittings, Tank)

NICKEL

International Nickel Co, Inc, N. Y. C.—p. 13

NUTS, RESISTANCE WELDING

Ohio Nut & Bolt Co, Berea, O.

OVENS, ELECTRODE DRYING

Electric Arc, Inc, 152 Jelliff St, Newark, N. J.
Steiner-Ives Co, 16 Avenue L, Newark, N. J.—p. 107

OXYGEN, COMPRESSED

Air Reduction Sales Co, 60 E 42nd, N. Y. C.—p. 24
Greyhound Elec. Mfg. Co, Inc, 31 Grand, Brooklyn—p. 125
Linde Air Prod. Co, 30 E 42nd, N. Y. C.—p. 11, 23
Liquid Carbonic Corp, 3100 S Kedzie, Chicago—p. 111
National Cylinder Gas Co, 205 W Wacker, Chicago—p. 19
Balbach Co, 13th & California, Omaha, Nebr.
Commercial Gas Corp, 286 Carey Ave, Wilkes-Barre, Pa.
Indiana Oxygen Co, 435 S Delaware, Indianapolis
Industrial Oxygen Co, 1377 S 7th, Louisville, Ky.
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
Puritan Compr. Gas Corp, 2012 Grand Ave, Kansas City, Mo.
Southern Oxygen Co, Arlington, Va.

Look for the noun name in the product listing, such as: *"Lighters, Torch"* not "Torch Lighters"

Who . . . MAKES IT

PINS, RESISTANCE WELDING

Ohio Nut & Bolt Co, Berea, Ohio

PIPE FITTINGS, WELDING

Bonney Forge & Tool Works, Allentown, Pa.
Crane Co, Chicago
Grinnell Co, Providence, R. I.
Lenape Hydraulic Press & Forg. Co, West Chester, Pa.
Midwest Piping & Supply Co, Inc, 2nd & Barry, St. Louis
Taylor Forge & Pipe Wks, Cicero, Ill.
Tube-Turns, 224 E. Broadway, Louisville, Ky.

PIPE WELDING CLAMPS
(See Jigs, Pipe Welding)

PLOW SHARE RECLAIMING UNITS

Wiese Plow Welding Co, 1507 5th Ave, Perry, Ia.—p. 127

PLUGS & RECEPTACLES, HEAVY DUTY

Albert & J. M. Anderson Mfg. Co, 289 "A" St, Boston—p. 114
General Elec. Co, Schenectady, N. Y.—p. 20, 21
Welding Engrg. Co, 264 E. Ogden, Milwaukee—p. 16, 17
Howard B. Jones, 2300 Wabansia, Chicago

POLISHER (PORTABLE)
(See Flexible Shaft Equipment)

PORTABLE WELDING SHOPS

Couse Laboratories, Inc, 300 Passaic, Newark, N. J.

POSITIONERS, WELDING

Bentley Weldery, Inc, 211 Riegel St, Syracuse, N. Y.—p. 105
Chicago Hdwe. Fdy. Co, North Chicago, Ill.—p. 117
Cullen-Friestedt Co, 1300 S Kilbourn, Chicago—p. 90
Electric Arc, Inc, 152 Jelliff, Newark, N. J.
Harnischfeger Corp, 4400 W National, Milwaukee—p. 18
Ransome Concrete Machy. Co, Dunellen, N. J.—p. 108
Mississippi Valley Struc. Co, Melrose Park, Ill.
National Supply Co, Torrance, Cal.
Stoody Co, Whittier, Calif.
United Engrg. & Fdy. Co, First National Bldg, Pittsburgh

POSITIONERS, WELDING-MAGNETIC

F. W. Shrader Company, 5788 Washington Blvd, Culver City, Cal.

POSITIONERS, WELDING-VACUUM

Glenn-Roberts Co, Inc, 1009 Fruitvale, Oakland, Cal.—p. 91

PREHEATING, ANNEALING, STRESS RELIEVING COILS, ELECTRIC

Electric Arc, Inc, 152 Jelliff, Newark, N. J.
H. O. Swoboda, Inc, New Brighton, Pa.

PREHEATING TORCHES

Air Reduction Sales Co, 60 E 42nd, N. Y. C.—p. 24
Albert & J. M. Anderson Mfg. Co, 289 "A" St, Boston—p. 114
Bastian Blessing Co, 4201 Peterson, Chicago—p. 121
Dockson Corp, 3839 Wabash, Detroit—p. 98
Gasweld Equipment Co, 625 Jackson, Chicago—p. 111
Harris Calorific Co, 5501 Cass Ave, N W, Cleveland—p. 6
Linde Air Prod. Co, 30 E 42nd, N. Y. C.—p. 11, 23
Liquid Carbonic Corp, (Wall Chemicals, Div), 3100 S Kedzie, Chicago—p. 111
Alexander Milburn Co, Baltimore, Md.—p. 102
Victor Equip. Co, 844 Folsom, San Francisco—p. 14, 89
Craftsweld Equip. Corp, 2727 Jackson, L. I. City, N. Y.
Imperial Brass Mfg. Co, 1200 Harrison, Chicago
K-G Weld. & Cutting Co, Inc, 519 W. 29th N. Y. C.
Modern Engrg. Co, 3411 Pine, St. Louis
Smith Weld. Equip. Corp, 2633—4th St, S E, Minneapolis
Torit Mfg. Co, 270 Walnut, St. Paul, Minn.
Unique Mfg. Co, Inc, 221 W Walton, Chicago
Welders Supply & Mfg. Co, 108 W Central Pkwy., Cincinnati

Who . . . MAKES IT

PROJECTION WELDERS, RESISTANCE

Acro Welder Mfg. Co, Inc, 1825 W St. Paul, Milwaukee—p. 115
Eisler Engrg. Co, 749 S 13th, Newark, N. J. p. 127
Acme Electric Welder Co, 2618 Fruitland Rd, Los Angeles
Agnew Elec. Co, Milford, Mich.
American Elec. Fusion Corp, 2610 Diversey, Chicago
Armglo Co, 3618 W Pierce, Milwaukee
Electric Weld. Mach. Co, 9635 French Rd, Detroit
Federal Machine & Welder Co, Warren, Ohio
Multi-Hydromatic Weld. & Mfg. Co, 9640 Grinnell, Detroit
National Elec. Weld. Machines Co, Bay City, Mich.
Progressive Welder Co, 3050 E Outer Dr, Detroit
Sciaky Corp, Chicago
Taylor-Winfield Corp, Warren, Ohio
Thomson-Gibb Elec. Co, Lynn, Mass.
Welding Machines Mfg. Co, 17325 Lamont, Detroit

RAIL WELDER, ELECTRIC FLASH BUTT

Sperry Products, Inc, 1505 Willow, Hoboken, N. J.

REELS, WIRE

(See Electrode Processing Equipment)

REFRIGERATION UNITS (RESISTANCE WELDER)

Weltronic Corp, 3080 S Outer Dr, Detroit

REGALVANIZING RODS

Galv-Weld, Inc, 314 W 1st St, Dayton, O.

REGULATORS, OXYGEN & ACETYLENE

Acetylene and Oxygen Supply Co, Inc, 30-30 Northern Blvd, L. I. City, N. Y.—p. 126
Air Reduction Sales Co, 60 E 42nd, N. Y. C. —p. 24
Bastian-Blessing Co, 4201 Peterson, Chicago—p. 121
Dockson Corp, 3839 Wabash, Detroit—p. 98
Gasweld Equipment Co, 625 W Jackson, Chicago—p. 111
Greyhound Elec. Mfg. Co, Inc, 31 Grand, Brooklyn—p. 125
Harris Calorific Co, 5501 Cass N W, Cleveland—p. 6
Linde Air Prod. Co, 30 E 42nd, N. Y. C.—p. 11, 23
Liquid Carbonic Corp, Wall Chemicals Div, Chicago—p. 111
Alexander Milburn Co, Baltimore, Md. p. 102
National Cylinder Gas Co, 205 W Wacker, Chicago—p. 19
Victor Equip. Co, 844 Folsom, San Francisco—p. 14, 89
Craftsweld Equip. Corp, 2727 Jackson, L. I. City, N. Y.
General Weld. & Equip. Co, 268 Northampton, Boston
Imperial Brass Mfg. Co, 1200 Harrison, Chicago
K-G Weld. & Cutting Co, Inc, 519 W 29th, N. Y. C.
John R. Miles, Inc, Prescott, Wis.
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
John Nageldinger & Son, Inc, 409 E 91st, N. Y. C.
Smith Weld. Equip. Corp, 2633—4th St, S E, Minneapolis
Smith Weld. Equip. Eastern Corp, Willow Gr., Pa.
Southern Oxygen Co, Arlington, Va.
Superior Oxy-Acetylene Mach. Co, 1102 High, Hamilton, Ohio
Welders Supply & Mfg. Co, 108 W Central Pky., Cincinnati
Weldit Acetylene Co, 638 Bagley, Detroit

RESISTANCE WELDERS

(See type—Butt, Flash, Guns, Projection, Seam, Spot etc.)

RESPIRATORS

American Optical Co, Southbridge, Mass.—p. 9
Mine Safety Appliances Co, Pittsburgh
Pulmosan Safety Equip. Co, 176 Johnson St, Brooklyn
Willson Prod., Inc, 2nd & Washington, Reading, Pa.

RHEOSTATS

Electric Arc, Inc, 152 Jelliff, Newark, N. J.
General Elec. Co, Schenectady, N. Y.—p. 20, 21
Cutler Hammer, Inc, 315 N 12th St, Milwaukee, Wis.
Ohmite Mfg. Co, 4835 W Flournoy, Chicago

ROTARY FILES

Stow Mfg. Co, Binghamton, N. Y.—p. 113

SALT TABLETS & DISPENSERS

International Salt Co, Scranton, Pa.
Morton Salt Co, Chicago
Standard Safety Equip. Co, 232 W Ontario, Chicago

SANDER, PORTABLE

(See Flexible Shaft Equipment)

SCALING HAMMERS

(See Cleaning Tools)

SEAM WELDERS, RESISTANCE

Acro Welder Mfg. Co, Inc, 1825 W St. Paul, Milwaukee—p. 115
Eisler Engrg. Co, 749 S 13th, Newark, N. J. p. 127
Acme Electric Welder Co, 2618 Fruitland Rd, Los Angeles
Agnew Elec. Co, Milford, Mich.
American Elec. Fusion Corp, 2610 Diversey, Chicago
Electric Weld. Machine Co, 9635 French Rd, Detroit
Federal Machine & Welder Co, Warren, Ohio
National Elec. Weld. Mach. Co, Bay City, Mich.
Progressive Welder Co, 3050 E Outer Dr, Detroit
Sciaky Corp, Chicago
Swift Elec. Welder Co, 6560 Epworth Blvd, Detroit
Taylor-Winfield Corp, Warren, Ohio
Thomson-Gibb Elec. Weld. Co, Lynn, Mass.
Weldex, Inc, 7326 McDonald, Detroit
Welding Machines Mfg. Co, 17325 Lamont, Detroit

SOLDER, ALUMINUM

Aladdin Rod & Flux Mfg. Co, Grand Rapids, Mich.—p. 127
Chicago Hdwe. Fdy. Co, North Chicago, Ill. —p. 117
Eutectic Weld. Alloys, Inc, 40 Worth St, N. Y. C.—p. 125
Metal Bond Mfg. Co, 3201 Kossuth, St. Louis—p. 126
Steel Sales Corp, 3348 S Pulaski, Chicago—p. 109
Welding Alloys Mfg. Co, 744 Broad St, Newark, N. J.—p. 126
Wooldridge Alum. Weld. Prod. Co, Glastonbury, Conn.—p. 125
Imperial Brass Mfg. Co, 1200 Harrison, Chicago
Lloyd S. Johnson, 2241 Indiana, Chicago
Smith Weld. Equip. Corp, 2633—4th St, S E, Minneapolis

SOLDER, HARD

Eutectic Weld. Alloys, Inc, 40 Worth, N. Y. C.—p. 125
Handy & Harman, 82 Fulton St, N. Y. C.—p. 10
McCauley Alloy Sales Co, 123 W Madison, Chicago—p. 123
Metal Bond Mfg. Co, 3201 Kossuth, St, Louis, Mo.—p. 126
Chase Brass & Copper Co, Inc, Waterbury, Conn.

Look for the noun name in the product listing, such as: *"Solder, Silver"* not "Silver Solder"

SOLDER, SILVER

Air Reduction Sales Co, 60 E 42nd, N. Y. C. —p. 24
Eutectic Weld. Alloys, Inc, 40 Worth St, N. Y. C.—p. 125
Handy & Harman, 82 Fulton St, N. Y. C. —p. 10
McCauley Alloy Sales Co, 123 W Madison, Chicago—p. 123
P. R. Mallory & Co, Indianapolis, Ind.—p. 22
Steel Sales Corp, 3348 S Pulaski, Chicago—p. 109
Chase Brass & Copper Co, Waterbury, Conn.
Goldsmith Bros. Smelt. & Refin. Co, 58 E Washington, Chicago
Joseph T. Ryerson & Son, Inc, Chicago
S-M-S Corp, 1165 Harper, Detroit

SOLDERING OUTFITS

(See Welding Torches, Gas)

SODIUM SILICATE

Electric Arc, Inc, 152 Jelliff St, Newark, N. J.
Philadelphia Quartz Co, 125 S 3rd, Philadelphia—p. 127

SPATTER PREVENTIVE

Air Reduction Sales Co, 60 E 42nd, N. Y. C. —p. 24
Electric Arc, Inc, 152 Jelliff, Newark, N. J.
General Elec. Co, Schenectady, N. Y.—p. 20, 21
Universal Power Corp, 4300 Euclid, Cleveland—p. 124
Wayne Chem. Prod. Co, 9800 Copeland, Detroit—p. 110
John C. Dolph Co, 170A Emmett, Newark, N. J.
New York Weld. Supply Co, 72 Grand, N. Y. C.
C. W. Smith & Sons, Dayton, O.

SPOT WELDERS

Acro Welder Mfg. Co, Inc, 1825 W St. Paul, Milwaukee—p. 115
Eisler Engrg. Co, 756 S 13th, Newark, N. J. —p. 127
Electric Arc, Inc, 152 Jelliff, Newark, N. J.
Greyhound Elec. Mfg. Co, Inc, 31 Grand St, Brooklyn—p. 125
Universal Power Corp, 4300 Euclid, Cleveland—p. 124
Acme Elec. Welder Co, 2618 Fruitland, Los Angeles
Agnew Elec. Co, Milford, Mich.
Alphil Spot Welding Co, 431 W. Broadway, N. Y. C.
American Elec. Fusion Corp, 2610 Diversey, Chicago
Armglo Co, 3618 W Pierce, Milwaukee
Brigg's Mfg. Co, Detroit
Cotter Thermo-Elec. Co, 15368 Baylis, Detroit
Dyer Welder & Engrg. Co, 7 E 19th, Kansas City, Mo.
Electric Weld. Machine Co, 9635 French, Detroit
Federal Machine & Welder Co, Warren, Ohio
Micro Prod. Co, Peoria, Ill.
National Elec. Weld. Mach. Co, Bay City, Mich.
Pier Equip. Mfg. Co, 502 Cross, Benton Harbor, Mich.
Progressive Welder Co, 3050 E Outer Dr, Detroit
Sciaky Corp, Chicago
Swift Elec. Welder Co, 6560 Epworth, Detroit
Taylor-Winfield Corp, Warren, Ohio
Thomson-Gibb Elec. Welding Co, 161 Pleasant St, Lynn, Mass.
Topeka Fdy. & Iron Wks, Topeka, Kan.
Weldex, Inc, 7326 McDonald Ave, Detroit
Welding Mach. Mfg. Co, 17325 Lamont, Detroit

SPOT WELDERS, MULTIPLE

Acro Welder Mfg. Co, Inc, 1825 W St. Paul, Milwaukee—p. 115
Eisler Engrg. Co, 756 S 13th, Newark, N. J. —p. 127
Electric Arc, Inc, 152 Jelliff, Newark, N. J.
Acme Elec. Welder Co, 2618 Fruitland, Los Angeles
Agnew Elec. Co, Milford, Mich.
American Elec. Fusion Corp, 2610 Diversey, Chicago
Armglo Co, 3618 W Pierce, Milwaukee
Electric Weld. Mach. Co, 9635 French, Detroit
Federal Machine & Welder Co, Warren, Ohio
Pier Equip. Mfg. Co, 502 Cross, Benton Harbor, Mich.
Progressive Welder Co, 3050 E Outer Dr, Detroit
Sciaky Corp, Chicago
Taylor-Winfield Corp, Warren, Ohio
Thomson-Gibb Elec. Weld. Co, Lynn, Mass.
Welding Machines Mfg. Co, 17325 Lamont, Detroit

Who . . . MAKES IT

SPOT WELDERS, PORTABLE
Taylor-Winfield Corp, Warren, Ohio
Weldex, Inc, 7326 McDonald, Detroit

SPOT WELDING GUNS
(See Guns, Resistance, Spot Welding)

STEEL (SHEETS, PLATES STRUCTURAL SHAPES, ETC)
Bethlehem Steel Co, Bethlehem, Pa.
American Rolling Mill Co, Middletown, Ohio
Carnegie-Ill. Steel Corp, Pittsburgh, Pa.
Crucible Steel Co of America, N. Y. C.
Henry Disston & Sons, Tacony, Philadelphia, Pa.
Great Lakes Steel Corp., Detroit
Ingersoll Steel & Disc Co, Chicago
Inland Steel Co, Chicago
Jessop Steel Co, Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh
Lukens Steel Co, Coatesville, Pa.
Otis Steel Co, Cleveland
Republic Steel Corp, Cleveland, Ohio
Jos. T. Ryerson & Son, Inc, 2558 W 16th, Chicago
Sharon Steel Corp, Sharon, Pa.
U. S. Steel Co, Pittsburgh, Pa.
Alan Wood Steel Corp, Conshocken, Pa.
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American Rolling Mill Co, Middletown, Ohio
American Steel & Wire Co, Cleveland
Carnegie-Illinois Steel Corp, Pittsburgh
Carpenter Steel Co, Reading, Pa.
Crucible Steel Co of America, N. Y. C.
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Jessop Steel Co, Washington, Pa.
Republic Steel Corp, Cleveland, Ohio
Jos. T. Ryerson & Son, Inc, 2558 W 16th, Chicago
Sharon Steel Corp, Sharon, Pa.
U. S. Steel Corp, Pittsburgh

STEEL, STAINLESS CLAD
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Jessop Steel Co, Washington, Pa.

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Detroit Testing Mach. Co, 9390 Grinnell, Detroit
Riehle Testing Mach. Co, E Moline, Ill.

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Lloyd S. Johnson, 2241 Indiana, Chicago
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TORCHES
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Preheating Torches—Underwater Torches)

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Smooth-On Mfg. Co, Communipaw Ave, Newark, N. J.

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McKay Co, 1005 Liberty Ave, Pittsburgh
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Perry Equip. & Supply Co, 1515 W Thompson St, Philadelphia
Revere Copper & Brass Co, 230 Park Ave, N. Y. C.

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Bonney-Floyd Co, 611 Marion, Columbus, Ohio
Dymonhard Corp, 250 W 57th, N. Y. C.
Ergolyte Mfg. Co, 3644 N Lawrence, Philadelphia
Osage Metal Co, Inc, Oklahoma City, Okla.
C. E. Phillips & Co, 2750 Poplar, Detroit
Jos. T. Ryerson & Son, Inc, 2558 W 16th, Chicago
Stoody Co, Whittier, Calif.

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Burgess-Parr Co, Freeport, Ill.

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American Steel & Wire Co, Cleveland
Carpenter Steel Co, Reading, Pa.
Crucible Steel Co of America, N. Y. C.
Ergolyte Mfg. Co, 3644 N Lawrence, Philadelphia
Joseph T. Ryerson & Son, Inc, 2558 W 16th St, Chicago

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American Steel & Wire Co, Cleveland
Chicago Steel & Wire Co, 103rd & Torrence, Chicago
K-G Welding & Cutting Co, Inc, 519 W 29th, N. Y. C.
C. E. Phillips & Co, 2750 Poplar, Detroit
John A. Roebling's Sons Co, Trenton, N. J.
Jos. T. Ryerson & Son, Inc, 2558 W 16th, Chicago
Scully Steel Prod. Co, 1319 Wabansia, Chicago
Stoody Co, Whittier, Calif.
Wickwire-Spencer Steel Co, 500 5th Ave, N. Y. C.

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Fansteel Metallurgical Corp, N Chicago, Ill.

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General Weld. & Equip. Co, 268 Northampton, Boston
Imperial Brass Co, 1200 Harrison, Chicago
K-G Weld. & Cutting Co, Inc, 519 W 29th, N. Y. C.
John R. Miles, Inc, Prescott, Wis.
Modern Engrg. Co, Inc, 3401 Pine, St. Louis
John Nageldinger & Son, Inc, 409 E 91st, N. Y. C.
New York Weld. Supply Co, 72 Grand, N. Y. C.
Smith Weld. Equip. Corp, 2633—4th St, S E, Minneapolis
Superior Oxy-Acetylene Mach. Co, 1102 High, Hamilton, Ohio
Welders Supply & Mfg. Co, 108 W Central Pkwy., Cincinnati

WELDING WIRE, AUTOMATIC

Allied Weld-Craft, Inc, Indianapolis, Ind.
Una Welding, Inc, 1815 Collamer, Cleveland, O.

WHEELS, GRINDING

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Macklin Co, Jackson, Mich.—p. 7
Norton Co, Worcester, Mass.
Abrasive Co, Tacony & Fraley, Philadelphia
Atlantic Abrasive Corp, So Braintree, Mass.
Bay State Abrasive Prod. Co, Westboro, Mass.
Carborundum Co, Niagara Falls, N. Y.
A. P. deSanno & Son, Inc, Phoenixville, Pa.
Metallizing Engrg. Co, Inc, 21-07—41st Ave, L. I. City, N. Y.
Safety Grind. Wheel & Mach. Co, Springfield, Ohio
Simonds Worden White Co, Dayton, Ohio
Sterling Grind. Wheel Div., Tiffin, Ohio

WIRE FORMING MACHINES

(See Electrode Processing Equipment)

X-RAY EQUIPMENT

General Electric X-Ray Corp, 2012 Jackson Blvd, Chicago
Kelly-Koett Mfg. Co, Covington, Ky.
Picker X-Ray Corp, 300 4th Ave, N. Y. C.
St. John X-Ray Service, Inc, 3020 Thompson, L. I. City, N. Y.
Westinghouse X-Ray Division, 2519 Wilkens Ave, Baltimore, Md.

WELD YOUR WAY TO VICTORY

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See details on page 128 of this issue

DIRECTORY OF TRADE NAMES

Here's the place to go to check up on that name, what it stands for and who makes it. Included with the trade name and manufacturer's address is a brief identification of the product to help determine whether it is the one in question. Where company name precedes trade name see under the trade name for listing. For details about a product's characteristics and applications see your copy of The Welding Encyclopedia or write the manufacturer direct.

A

ABC—Sheet aluminum fluxes—Anti-Borax Comp. Co., Ft. Wayne, Ind.

Abrasive—Grinding wheels—Abrasive Co., Tacony & Fraley, Phila.

Abrasoweld—Hard facing electrodes—Lincoln Elec. Co., 12818 Coit Rd., Cleveland

Ace—A.C. arc welders—Pier Equip. Mfg. Co., 502 Cross, Benton Harbor, Mich.

Acme "Hot Spot" — Spot welders — Acme Elec. Welder Co., 2618 Fruitland Rd., Los Angeles

Acro—Resistance welders & accessories—Acro Welder Mfg. Co., Inc., 1825 W. St. Paul, Milwaukee

Actarc — Welding lenses — American Agile Corp., 5806 Hough, Cleveland

A.C. Weld—Coated electrodes—Steel Sales Corp., 3348 S. Pulaski, Chicago

A.E.F. — Resistance welding machinery — American Elec. Fusion Corp., 2610 Diversey, Chicago

Aerisweld—Brass, bronze and copper electrode—Lincoln Elec. Co., 12818 Coit Rd., Cleveland

Agile — Electrodes, welding lenses and "Touch-welding alloy system" of welding, —American Agile Corp., 5806 Hough, Cleveland

Airco—Oxy-acetylene welding and cutting equipment and access. — Air Reduction Sales Co., 60 E. 42nd, N. Y. C.

Aladdin—Welding rod for welding white metal and soldering and brazing aluminum — Aladdin Rod & Flux Mfg. Co., Grand Rapids, Mich.

Alflux—Aluminum welding fluxes—Wooldridge Alum. Weld. Prod., Glastonbury, Conn.

Alloy — Carbon molybdenum electrodes — Air Reduction Sales Co., 60 E. 42nd, N. Y. C.

Alloy Aircraft — Aircraft alloy tubing — Champion Rivet Co., East 108 & Harvard, Cleveland

Alloy 502—35Ni-18Cr welding electrode wire —Hoskins Mfg. Co., 4445 Lawton, Detroit

Alloy No. 1300 and No. 1270—For welding copper, brass or bronze—Alloy Specialties Co., 2441 Waverly, Swissvale, Pa.

Almarc — Aluminum welding electrodes — Wooldridge Alum. Weld. Prod., Glastonbury, Conn.

Aloxite—Aluminum oxide grinding wheels and coated abrasives—Carborundum Co., Niagara Falls, N. Y.

Alsod—Aluminum solder and flux—Wooldridge Alum. Weld. Prod., Glastonbury, Conn.

Alternarc—A.C. electric welding equipment —Electric Arc, Inc., 152 Jewett, Newark, N. J.

Alternex—Electrode for use with low, open circuit voltage, A.C. welders — Metal & Thermit Corp., 120 Broadway, N. Y. C.

Alumaweld—Aluminum and aluminum alloy solder; also all metal solders and fluxes—Lloyd S. Johnson, 2241 Indiana, Chicago

Aluminark—Aluminum electrode—Westinghouse Elec. & Mfg. Co., E. Pittsburgh

Aluminox—Cast aluminum steel for gas welding—Central Steel & Wire Co., 3000 W. 51st St., Chicago

Aluminweld—Aluminum electrodes—Lincoln Electric Co., 12818 Coit Rd, Cleveland

Alundum—Grinding wheels for use on steel & annealed malleable iron—Norton Co., Worcester, Mass.

A-Mal-Gam—Fluxes—Smith Welding Equip Corp., 2633 4th, S. E., Minneapolis

Ambraloy—Copper aluminum alloys—American Brass Co., Waterbury, Conn.

Amco—Fluxes, pastes and soldering acids—American Solder & Flux Co., 2152 E. Norris, Phila.

Amerclad — Rubber-clad welding cables — American Steel & Wire Co., Cleveland

Ampco Beryllium Copper—Flash welding dies and arc welding coated electrodes—Ampco Metal, Inc., Milwaukee

Ampco-Trode Weldrods—Coated aluminum bronze electrodes and welding rods — Ampco Metal, Inc., Milwaukee

Amsco—Manganese nickel electrodes, welding rods, hard facing rods, repointer bars, wedge bars, filler and applicator bars, and fluxes—American Mang. Steel Div., Chicago Heights, Ill.

Anaconda—Copper and copper alloy products—American Brass Co., Waterbury, Conn.

Anaconda Economy Bronze—Welding rods used as sub. for genuine Tobin bronze—American Brass Co., Waterbury, Conn.

Anaconda 997—Bronze welding rod—American Brass Co., Waterbury, Conn.

Anaconda Super Nickel—Welding rods approximately 30% Ni. and 70% Cu.—American Brass Co., Waterbury, Conn.

Anderson—Ground clamp—Albert & J. M. Anderson Mfg. Co., 289 "A" St., Boston

Anode—A non-ferrous bare electrode for use on cast iron—Lincoln Electric Co., Cleveland

Anti-Borax — Fluxes — Anti-Borax Comp. Co., Ft. Wayne, Ind.

AO—Welding gloves and clothing, Helmets, Respirators, Spot welders' goggles and other protective equipment — American Optical Co., Southbridge, Mass.

AP—Welding electrode—Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

Aquamag—A natural magnesium oxide filler in welding rod coatings—Foote Mineral Co., 1622 Summer, Phila.

Aqua Sol — Water soluble grinding compound—Wayne Chemical Prod. Co., 9800 Copeland, Detroit

Arcaloy — Stainless steel electrodes and welding rods — Alloy Rods Co., 501 E. Prospect, York, Pa.

Arcast—Flux coated, cast iron electrodes—American Arc Welders, Inc., Roseau, Minn.

Arc-Ban—Welders' goggle and cover all goggle — Bausch & Lomb Opt. Co., Rochester, N. Y.

Arc-Ban—Welders' goggles—Kimball Safety Prod. Co., 7314 Wade Park, Cleveland

Arc-Craft—Electrodes—Allied Weld-Craft, Inc., Indianapolis, Ind.

Arcmaster—A.C. welder—Bear Mfg. Co., 2020 5th Ave., Rock Island, Ill.

Arcmaster—High frequency attachment for any type welder—Welding Apparatus Co., 2750 W. Van Buren, Chicago

Arcos — Special alloy electrodes — Arcos Corp., 401 N. Broad, Philadelphia

Arcronograph — Graphic arc welder recorder—Rubicon Co., Ridge at 35th, Philadelphia

Arc-Wel—Electrodes for machinable electric welds on cast iron—Northeast Metals Co., 4124 Torresdale Ave., Phila.

Armco — Uniform iron of high purity — American Rolling Mill Co., Middletown, Ohio

Armglo — Resistance welders, resistance welder automatic timers and electrodes—Armglo Co., 3618 W. Pierce, Milwaukee

Armor Alloy—for armor plate—Champion Rivet Co., 108 & Harvard, Cleveland

Armorarc Type A—Stainless steel welding rods and electrode for welding armor plate—Alloy Rods Co., 501 E. Prospect, York, Pa.

Armorweld—Electrodes for welding armor plate—Lincoln Electric Co., Cleveland

Armstrong—Drop forged C-clamps—Armstrong Bros. Tool Co., 317 N. Francisco, Chicago

Atco—Cast iron welding rods—Atlas Foundry Co., 3600 W. 69th, Cleveland

Atlas—Cast iron welding flux—Air Reduction Sales Co., 60 E. 42nd, N. Y. C.

Atlas—Weld cleaning tools, electrode holders, brushes, hammers, metal stamps and a crater eliminator—Atlas Welding Access. Co., Boulevard Bldg., Detroit

Autochemic—Welding alloys, fluxes, and compounds—Eutectic Weld. Alloys, Inc., 40 Worth St., N. Y. C.

Automat — Gas saving torches — Modern Engr. Co., St. Louis

B

Balbach—Oxygen and acetylene—Balbach Co., 13th & California, Omaha

Bay State — Grinding wheels — Bay State Abras. Prod. Co., Westboro, Mass.

BBB—Carbon products—Becker Bros. Carbon Co., 3450 S. 52nd, Cicero

Bergstrom — Hard surfacing electrodes — Bergstrom Alloys Corp., Reno, Nev.

Big Brute—Solid copper ground clamp—Mueller Electric Co., 1597 E. 31 St., Cleveland

Bilt-Rite—Welding goggles—Chicago Eye Shield Co., 2300 Warren Blvd., Chicago.

Bilt Rite—Riveted type arc welding helmets —Dockson Corp., 3839 Wabash, Detroit

Bingrod — Hardfacing welding rod — The Bingrod Co., 460 W. Michigan, Kalamazoo, Mich.

Black & Decker—Portable electric grinders —Black & Decker Mfg. Co., Towson, Md.

Black Devil—Electrode, for horizontal and downhand welding on mild steel—Champion Rivet Co., Cleveland, O.

Blinker—Welding helmet with chin operated lens—Welding Apparatus Co., 2750 W. Van Buren, Chicago

Bluedac — Electrode for A.C. welding — Champion Rivet Co., Cleveland, O.

Blue Devil—All position electrode for mild steel—Champion Rivet Co., Cleveland, O.

Blue Devil 85—All position electrode for high strength steels—Champion Rivet Co., Cleveland, O.

Blue-Rod—Cast iron electrodes—Marquette Mfg. Co., Minneapolis

Blukote — Coated electrode for cast iron welding—Central Steel & Wire Co., 3000 West 51st St., Chicago

For Details See Your Copy of The Welding Encyclopedia or Write The Manufacturer Direct

Who . . . Makes It

Borax-ette—Welding flux for forge welding—Cortland Weld. Comp. Co., Cortland, N. Y.
Borcote—Organic filler and extender—Foote Mineral Co., 1622 Summer, Philadelphia
Borium — Cast tungsten carbon inserts—Stoody Co., Whittier, Cal.
Borod—Tungsten carbide hard-facing rod—Stoody Co., Whittier, Cal.
Brazall—Brazing flux—F. R. Faulk, 405 Penn Ave., Pittsburgh
Brazarc — Bronze arc welding rod — Universal Power Corp., 4300 Euclid, Cleveland
Braz-Cast—Flux for bronze welding cast iron—Anti-Borax Comp. Co., Ft. Wayne, Ind.
Brazo — Bronze-welding flux — Linde Air Prod. Co., 30 East 42nd St., N. Y. C.
Brazox—Soft brass brazing wire—Central Steel & Wire Co., 3000 West 51st, Chicago
Braz-Weld—Self-fluxing brazing and welding rods—Krembs & Co., 669 W. Ohio, Chicago
Bridgeport—Bronze welding alloys, welding rod, and copper and copper alloy products—Bridgeport Brass Co., Bridgeport, Conn.
Briggs—Portable spot welders and stationary aluminum alloy spot welders—Briggs Mfg. Co., Detroit
Bright Boy—Light abrasive incorporated in soft rubber, for removing heat marks from stainless steel — Weldon Roberts Rubber Co., Newark, N. J.
Bronzark—Bronze electrode—Westinghouse Electric & Mfg. Co., E. Pittsburgh
Bronze-Arc—Electrodes for welding malleable iron, and bronze and copper alloys—American Arc Welders, Inc., Roseau, Minn.
Bronzend—Bronze-alloy electrodes — Arcos Corp., 401 N. Broad, Philadelphia
Bronzochrom—Welding and building-up alloys and fluxes—Eutectic Weld. Alloys, Inc., 40 Worth St., N. Y. C.
Bronzox M—Low fuming bronze rod for gas welding—Central Steel & Wire Co., 3000 West 51st, Chicago
Bronz-Rod — Bronze electrode — Marquette Mfg. Co., Minneapolis
Brown Devil—Vitreous enameled resistors—Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago
Bubble-Lite—Cover lenses—Jackson Products, 3265 Wight Ave., Detroit
Bull Dog—Welding hose—Boston Woven Hose & Rubber Co., Cambridge, Mass.
Bulldog—Clamp type electrode holders—Welding Engineering Co., 2872 N. 41 St., Milwaukee
Bulldog—Goggles—Willson Products, Inc., 2nd & Washington, Reading, Pa.
Burke—D.C. arc welders—Burke Elec. Co., Erie, Pa.

C

Calobar—Plates and lenses—American Opt. Co., Southbridge, Mass.
Camograph—Flame cutting machine—Air Reduction Sales Co., 60 E. 42nd, N. Y. C.
Candee-Smith — Governors for electrically driven gas welders — Candee's Machine Shop, 129 Llewellyn, Los Angeles
Carbic—Briquetted carbide floodlights and portable acetylene generators—Linde Air Prod. Co., 30 East 42nd, N. Y. C.
Carbo—Baked carbons—Hobart Bros. Co., Troy, Ohio
Carbon-Moly 50 — Low alloy electrode — Metal & Thermit Corp., 120 Broadway, N. Y. C.
Carbon-Moly 80 — Low alloy electrode — Metal & Thermit Corp., 120 Broadway, N. Y. C.
Carbora—Abrasive for non-ferrous metals—Cortland Grind. Wheels Corp., Chester, Mass.
Carborundum — Silicon carbide grinding wheels and coated abrasives—Carborundum Co., Niagara Falls, N. Y.
Carbox—Welding rods and electrodes—Central Steel & Wire Co., 4545 S. Western, Chicago
Carend—Thin sheet steel electrode—Arcos Corp., 401 N. Broad, Phila.
Carhoff — Electrode holders — Carhoff Co., 2050 Kensington, Cleveland
Carpenter—Stainless steel—Carpenter Steel Co., Reading, Pa.
Castingweld—Cast iron electrode—Westinghouse Elec. & Mfg. Co., E. Pittsburgh
Castiron—Cast iron electrode—Hobart Bros. Co., Troy, Ohio
Cast Iron Arc—Cast iron rod—Universal Power Corp., 4300 Euclid, Cleveland
Castolin Eutectic — Welding alloys and fluxes—Eutectic Weld. Alloys, Inc., 40 Worth, N. Y. C.
Castox—Cast iron steel for gas welding—Central Steel & Wire Co., 3000 West 51st St., Chicago
Cast-Rod—Cast iron electrodes—Marquette Mfg. Co., Minneapolis
Castweld — Cast iron welding rod — Steel Sales Corp., 3348 S. Pulaski, Chicago
C.C.C. Metal—Copper, cadmium, cobalt resistance welding tips — American Elec. Fusion Corp., 2610 Diversey, Chicago
Century — 100 M.A. X-ray generator — Picker X Ray Corp., 300 4th Ave., N. Y. C.
Certified Stainless Electrodes—Shielded arc, stainless steel welding electrodes—McKay Co., 1005 Liberty Ave., Pittsburgh
Cesco — Safety appliances — face shields, gloves, goggles, helmets, etc. — Chicago Eye Shield Co., 2300 Warren Blvd., Chicago
C-F—Welding positioners—Cullen-Friestedt Co., 1300 S. Kilbourn, Chicago
C-H — Rheostats and controls — Cutler-Hammer, Inc., Milwaukee
Challenger—Spot welders—Taylor-Winfield Corp., Warren, Ohio
Chamet Bronze — Bronze welding rods — Chase Brass & Copper Co., Inc., Waterbury, Conn.
Champion—All purpose steel electrodes—Champion Rivet Co., 108 & Harvard, Cleveland
Chase—Brass, bronze and copper products—Chase Brass & Copper Co., Inc., Waterbury, Conn.
Cherry Heat—Welding compound for forge welding — Cortland Weld. Comp. Co., Cortland, New York.
Chip-Weld—Combination welding and chipping goggle—Willson Products, Inc., 2nd & Washington, Reading, Pa.
Chromel—80 Ni-20Cr welding electrode wire—Hoskins Mfg. Co., 4445 Lawton, Detroit
Chrome Moly—Chrome moly steel for gas welding—Central Steel & Wire Co., 3000 West 51st St., Chicago
Chrome Vanox—Chrome vanadium welding rods and electrodes—Central Steel & Wire Co., 4545 S. Western, Chicago
Chromeweld—Chrome-steel electrodes—Lincoln Electric Co., Cleveland
Circle Arc—A.C. Transformer type welder and combination A.C. and D.C. welder—Circle Electric Co., Frankfort, Ind.
Circle Arc Rectifier—D.C. rectifier welder—Circle Electric Co., Frankfort, Ind.
Clark Kickless Cable—Water cooled electrical connection between secondary taps of a welder transformer and portable welder gun—Clark Controller Co., 1146 E. 152nd, Cleveland
Cleanweld — Welding fluxes — Cleanweld Prod. Co., 432 E. 71st, N. Y. C.
Cleco — Chippers, drills, grinders, etc. — Cleveland Pneumatic Tool Co., Marble & E. 77th, Cleveland
Climax—Welding compound for forge welding—Cortland Weld. Comp. Co., Cortland, N. Y.
Closefit — Welding goggles — Chicago Eye Shield Co., 2300 Warren Blvd., Chicago
CMD — Welders' chipping hammers and cleaning tools—Chicago Mfg. & Dist. Co., 1928 W. 46th St., Chicago
C.N.S.—High carbon-high chrome die steel—Jessop Steel Co., 627 Green St., Washington, Pa.
Coast Metals—Hard facing welding rods—Coast Metals, Inc., 1232 Camden S. W., Canton, Ohio
Coldarc Ionizer—For generating high tension potential on A.C. arc welders—A-C-Devices Co., 912 W. Van Buren, Chicago
Coldarc—Electric arc welding products—Eutectic Weld. Alloys, Inc., 40 Worth St., N. Y. C.
Coldweld — Welding alloys and fluxes — Eutectic Weld. Alloy, Inc., 40 Worth St., N. Y. C.
Colmonoy—Hard surfacing alloys and overlay metals, also hard surfacing parts by furnace welding process—Wall Colmonoy Corp., 637 Buhl Bldg., Detroit
Comet — Radiographic-fluoroscopic X-ray unit—Picker X Ray Corp., 300 4th Ave., N.Y.C.
Comfo—Dust and metal fume respirator—Mine Safety Appliances Co., Pittsburgh
Commonwealth—A.C. electric arc welders—Commonwealth Mfg. Co., 3200 Oxford, Philadelphia
Copper-Arc—Copper steel cast iron electrodes—American Arc Welders, Inc., Roseau, Minn.
Coppus—Ventilators for removing welding fumes — Coppus Engrg Co., Worcester, Mass.
Copr-Coat—Wire for welding work to be galvanized—Allied Weld-Craft, Inc., Indianapolis, Ind.
Corosoloy — Hard surfacing electrodes — Bergstrom Alloys Corp., Reno, Nev.
Corrib—Corrugated ribbon resistors—Ohmite Mfg. Co., 4835 W. Flournoy, Chicago
Corvic Bronze—Copper alloy—Chase Brass & Copper Co., Inc., Waterbury, Conn.
Cotter—Arc and spot welders and transformers — Cotter Thermo-Electric Co., 15368 Baylis, Detroit
Couse Welding Cruiser—Portable combination welding and machine shop—Couse Laboratories, Inc., 300 Passaic St., Newark, N. J.
Coverspecs—Goggle to be worn over glasses—Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Cowles Cleaners—Alkaline metal and wire cleaners — Cowles Detergent Co., 7016 Euclid, Cleveland
Craftsweld — Oxy-acetylene welding and cutting equipment — Craftsweld Equip. Corp., 2727 Jackson, Long Island City, N. Y.
Crane—Welding pipe fittings—Crane Co., Chicago
Crater-Filler—Weld crater controller—General Electric Co., Schenectady, N. Y.
Crescent — Forge welding fluxes — Anti-Borax Comp. Co., Ft. Wayne, Ind.
Cresta—Mild steel electrode—Metal & Thermit Corp., 120 Broadway, N. Y. C.
Cromaloy—Welding flux for all chromium-containing alloys—Linde Air Prod. Co., 30 East 42nd St., N. Y. C.
Cromansil—Low alloy chromium, manganese and silicon electrode—Metal & Thermit Corp., 120 Broadway, N. Y. C.
Crystolon — Grinding wheels for grinding castings of gray iron, unannealed malleable iron and the non-ferrous metals—Norton Co., Worcester, Mass.
Cupaloy—Alloy for tips and wheels for resistance welding machines — Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
Cutler-Hammer—High speed magnetic contactors and welding timers — Cutler-Hammer, Inc., Milwaukee
Cutmaster—Cutting torch—Modern Engrg. Co., Inc., 3401 Pine Blvd., St. Louis

D

Dalweld—Cable connector—Dallett Co., 165 W. Clearfield, Philadelphia
Darwin—Welding rods for restoration of tools and dies—Darwin & Milner, Inc., 1260-64 W. 4th St., Cleveland
Dayton—Grinding wheels—Simonds, Worden, White Co., Dayton, Ohio
Delloy—Hard facing rod compound of chromium, cobalt and tungsten — Delloy Metals, 3rd & Huntingdon, Philadelphia
Dens-O-Matic—Automatic welding wire—Allied Weld-Craft, Inc., Indianapolis, Ind.
De-Sta-Co—Toggle action welding clamps—Detroit Stamping Co., 372 Midland, Detroit
Determohn—Decade resistance boxes—Ohmite Mfg. Co., 4835 W. Flournoy, Chicago
Dialarc—A.C. arc welder—Shober Sales, Inc., 536 S. Aurora, Stockton, Cal.
Diamalloy—Hard-facing welding electrode—Diamalloy Co., Gowanda, N. Y.
Dieweld—High speed, tool steel electrodes—Steel Sales Corp., 3348 S. Pulaski, Chicago
Dividchm—Vitreous enameled semi-variable resistors—Ohmite Mfg. Co., 4835 W. Flournoy, Chicago
Dockweld—Welding lenses—Dockson Corp., 3839 Wabash, Detroit
Double Strength—Low alloy, high tensile steel—Republic Steel Corp., Cleveland
Drawalloy — Alloy electrode for forging, drawing and forming dies — Welding Equip. & Supply Co., 223 Leib, Detroit
Drednaut—Welding goggles—American Optical Co., Southbridge, Mass.
Ducto—Electrode for machinable cast iron welds—Hobart Bros. Co., Troy, Ohio
Ductone—Heavily coated mild steel electrodes—Chicago Steel & Wire Co., 103rd St. & Torrence, Chicago
Duo-Trol—Combined heat control and welding timer—National Time & Signal Corp., 603 E. Milwaukee Ave., Detroit
Duoweld—Oxygen and acetylene hose lines—B. F. Goodrich Co., Akron, Ohio
Duplex—Combination oxy-acetylene torch—K-G Welding & Cutting Co., Inc., 519 W. 29th St., N. Y. C.
Duraweld—Welding goggles—American Optical Co., Southbridge, Mass.
Durface — Hard-facing products — Eutectic Weld. Alloys, Inc., 40 Worth St., N. Y. C.
Duro—Electrode holders for arc welding—Churchward Engrg. Co., 43 Sperry St., New Haven, Conn.
Duronze—Silicon bronze—Bridgeport Brass Co., Bridgeport, Conn.

For Details See Your Copy of The Encyclopedia or Write The Manufacturer Direct

Who . . . Makes It

Dustcoat—Steel electrode—Marquette Mfg. Co., Minneapolis
Dustfoe—Dust respirator—Mine Safety Appliances Co., Pittsburgh
Duzweld—Welding and cutting equipment and supplies—New York Weld. Supply Co., 72 Grand St., N. Y. C.
Dymonhard — Hard-facing materials — Dymonhard Corp., 250 W. 57th St., N. Y. C.

E

Easy-Flo—Silver Brazing Alloy—Handy & Harman Co., 82 Fulton St., N. Y. C.
Easyweld—Coated, A.C. steel welding rod—Universal Power Corp., 4300 Euclid Ave., Cleveland
Econoloy—Work hardening, hard surfacing electrodes — Bergstrom Alloys Corp., Reno, Nev.
Eisler—Electric resistance spot welders—Eisler Engrg. Co., 756 S. 13th St., Newark, N. J.
E.J. Welder — Asbestos tan horsehide leather gloves—E. J. Streichert, 1747 N. Crawford, Chicago
Electric-Siameez—Two-braid welding hose —Electric Hose & Rubber Co., Wilmington, Del.
Electroloy—Resistance welding electrodes, tips, holders and accessories—The Electroloy Co., Inc., 1600 Seaview, Bridgeport, Conn.
Electronic Tornado — Automatic Shielded carbon arc welders—Lincoln Elec. Co., Cleveland
Electroweld—Spot welder—American Elec-Fusion Corp., 2610 Diversey, Chicago
Electroweld—Resistance welding machine—Electric Arc, Inc., 152 Jewett, Newark, N. J.
Elecweld—Mild steel electrodes—Steel Sales Corp., 3348 S. Pulaski, Chicago
Elkaloy—Copper alloy for spot welding tips —P. R. Mallory & Co., 3029 E. Washington, Indianapolis, Ind.
Elkonite—Copper-tungsten metals to face flash and projection welding dies—P. R. Mallory & Co., 3029 E. Washington, Indianapolis, Ind.
Elsberg — Under-water cutting torch — Craftsweld Equip. Corp., 2727 Jackson, Long Island City, N. Y.
Emco—Hard surfacing metal—Eld Metal Co., Ltd., 1233 E. 63rd, Los Angeles
Emerson—A.C. arc welders—Emerson Elec. Mfg. Co., 1824 Washington, St. Louis
Enduro—Stainless and heat-resisting steels —Republic Steel Corp., Cleveland
Ergolyte—A.C. arc welders, electric brazing outfits, helmets and hand shields—Ergolyte Mfg. Co., 3644 N. Lawrence, Phila.
Esco—Safety clothing and equipment—Eastern Safety Cloth. Co., 23 W. 60th, N. Y. C.
Eutectic—Welding alloys & fluxes—Eutectic Weld. Alloys, Inc., 40 Worth, N. Y. C.
Eureka—Metallic electrode holder—Fibre-Metal Prod. Co., 5th & Tilghman, Chester, Pa.
Eureka—Arc welding helmets—Welding Engineering Co., 2872 N. 41 St., Milwaukee
Eureka—Tool, die and alloy electrodes and rods for oil hardening, water hardening, air hardening and hot work — Welding Equip. & Supply Co., 223 Leib, Detroit
Everdur—Bronze welding rod—American Brass Co., Waterbury, Conn.
Ever-Klear—Processed cover lens—F. R. Faulk, 405 Penn Ave., Pittsburgh
E-Z — Forge welding fluxes — Anti-Borax Comp. Co., Ft. Wayne, Ind.

F

Faceweld—Hard facing electrodes—Lincoln Elec. Co., Cleveland
Falcon—Electric coils for annealing, preheating and stress relieving—H. O. Swoboda, Inc., 13th Street, New Brighton, Pa.
Fansteel—Pure tungsten rod for atomic hydrogen welding — Fansteel Metallurgical Corp., North Chicago, Ill.
Fastweld—Smooth finish, high speed electrodes—Steel Sales Corp., 3348 S. Pulaski, Chicago
Featherweight — Face shields — Dockson Corp., 3839 Wabash, Detroit
Federal—Resistance welders—Federal Machine & Welder Co., Warren, Ohio
Ferro—Welding flux for cast iron and steel castings—Linde Air Prod. Co., 30 East 42nd St., N. Y. C.
Ferroweld — Cast iron electrodes — Lincoln Electric Co., Cleveland
Fillex—Mild steel electrode for fillet welding and other downhand work — Metal & Thermit Corp., 120 Broadway, N. Y. C.
Filterweld — Plates and lenses — American Optical Co., Southbridge, Mass.
Fire King—Welding and cutting hose—B. F. Goodrich Co., Akron, Ohio
Flame-Shaper—Portable flame cutting machines—Schrader-Bowers Co., 2629 Lincoln Way West, Mishawaka, Ind.
Flash-Ex—Preventive against flash bonding to holder jaws and dies in resistance welders—Wayne Chemical Prod. Co., 9800 Copeland, Detroit
Fleetweld — Mild steel electrodes — Lincoln Electric Co., Cleveland
Flexarc—Arc welding machines, electrodes and accessories—Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
Flint Products—Gas lighters and renewal flints—Flint Prod. Co., 2176 Nostrand, Brooklyn, N. Y.
Flintweld—Hard facing rods & electrodes—Steel Sales Corp., 3348 S. Pulaski, Chicago
Fluxine—Line of fluxes, also hard surfacing compound—Krembs & Co., 669 W. Ohio St., Chicago
Flux-Well — Gas welding fluxes — Chicago Hdwe. Fdy. Co., North Chicago, Ill.
FP—Welding electrodes—Westinghouse Elec. & Mfg. Co., E. Pittsburgh
Freemachineweld—Cast iron welding electrode—Westinghouse Electric & Mfg. Co., E. Pittsburgh
Fre-Flo—Cast iron welding rods—Atlas Foundry Co., 3600 W. 69th, Cleveland
Frostrode—Refrigeration units for welding machines—Weltronic Corp., 3080 S. Outer Dr., Detroit
Fuse-Well—Electrodes and welding rods—Chicago Hdwe. Foundry Co., North Chicago, Ill.
Fuson—Alloy welding electrodes—Chicago Steel & Wire Co., 103rd and Torrence, Chicago
Fyber-Weld — All-fibre welding goggle — Chicago Eye Shield Co., 2300 Warren Blvd., Chicago

G

Galvalloy—Metalloys Co., 1351 E. 17th, Los Angeles
Galv-Weld—Process of regalvanizing after welding—Galv-Weld, Inc., 314 W. 1st, Dayton, Ohio
Gasaver—Auxiliary set of valves, for oxy-acetylene torches—Weldit Acetylene Co., 638 Bagley, Detroit
Gasflux — Liquid welding flux — Automatic Gasflux Mfg. Co., 198 Wayne, Mansfield, Ohio
Gasfluxer—Unit for dispensing liquid flux—Automatic Gasflux Mfg. Co., 198 Wayne, Mansfield, Ohio
Gaso—Gas cutting machines—Gaso Equipment Co., 2532 Irving Park, Chicago
Gas-O-Dome—Gas loaded diaphragm type regulators — Victor Equipment Co., 844 Folsom, San Francisco
Gaston Bull-Dog — Three-phase electric, portable edge grinder and disc snagger—Gaston Power Tools, Evergreen Park, Ill.
Gasweld—Welding and cutting equipment—Liquid Carbonic Corp., 3100 S. Kedzie, Chicago
G-E—Trade name for arc welding machines, x-ray machines, electrodes and accessories—General Electric Co., Schenectady, N. Y.
Genex—Mild steel electrode—Metal & Thermit Corp., 120 Broadway, N. Y. C.
Geweco—Automatic shape-cutting machines, also welding and cutting torches, and apparatus—General Weld. & Equip. Co., 268 Northampton, Boston
Giant Grip—A.C. electric weldrs—Giant Grip Mfg. Co., Oshkosh, Wis.
Glascote—Transparent liquid coating to prevent glass from pitting and breaking by weld spatter—John C. Dolph Co., 1704 Emmett, Newark, N. J.
Glyptal No. 1294—Weld spatter preventive—General Electric Co., Schenectady, N. Y.
G.M.C.—Portable D.C. arc welders for mines—Guyan Machinery Co., Logan, W. Va.
G-R — Transformer type A.C. welders — Glenn-Roberts Co., 1009 Fruitvale, Oakland, Cal.
Grand—Dual grip and quikcet welding clamps—Grand Specialties Co., 3117 W. Grand, Chicago
Gray Devil—General purpose, all position electrode—Champion Rivet Co., Cleveland, O.
Greyhound—Transformer type A.C. arc welders—Greyhound Elec. Mfg. Co., Inc., 31 Grand St., Brooklyn, N. Y.
Grinnell—Welding fittings and prefabricated piping—Grinnell Co., Providence, R. I.
Grip-Lok—Grinding wheels—Safety Grind. Wheel & Mach. Co., Springfield, Ohio
Guardsman — Attachment for converting regulator to 2 stage type—K-G Welding & Cutting Co., Inc., 519 W. 29th St.

H

Hammett — A.C. arc welders — Hammett Electric Mfg. Co., 209 W. 119th Terrace, Kansas City, Mo.
Hampton—A.C. welders, electrode holders, portable electric saws, etc.—Hampton Elec. Mfg. Co., 3rd & Archie, Oakmont, Pa.
Handy—Silver solders of various analysis—Handy & Harman Co., 82 Fulton St., N. Y. C.
Handy-Flux—Low temperature brazing flux liquid—Handy & Harman Co., 82 Fulton St., N. Y. C.
Hansen—See "P & H"
Harcast—Cast iron electrodes—Harnischfeger Corp., Milwaukee
Harcoat—Hard surfacing electrodes—Harnischfeger Corp., Milwaukee
Hard Kote—Wear resisting welding rod—The Bonney-Floyd Co., 611 Marion Rd., Columbus, Ohio
Hard-Nite—Hard facing metal—Eld Metal Co., Ltd., 1233 E. 63rd St., Los Angeles
Hardweld—Hard facing electrodes—Lincoln Electric Co., Cleveland
Hargrave—Clamps, chisels and punches—Cincinnati Tool Co., Norwood, Cincinnati
Harnichrome—4-6% chrome steel electrodes —Harnischfeger Corp., Milwaukee
Harnimang—Electrodes for welds subject to impact and abrasion—Harnischfeger Corp., Milwaukee
Harnimolly — Electrodes for machinable welds—Harnischfeger Corp., Milwaukee
Harris—Welding and cutting equipment—Harris Calorific Co., 5501 Cass Ave. N.W., Cleveland
Harrisburg — Seamless oxygen cylinders, etc.—Harrisburg Steel Corp., Harrisburg, Pa.
Harstain—Stainless steel electrodes—Harnischfeger Corp., Milwaukee
Harten—Electrodes for welding alloy steels —Harnischfeger Corp., Milwaukee
Hartung — Hard surfacing electrodes — Harnischfeger Corp., Milwaukee
Hayes—Torch machine for gas cutting steel plates to templet—Hayes Track Appl. Co., Richmond, Ind.
Hastalloy—Hard facing material—Haynes Stellite Co., Kokomo, Ind.
Haynes Stellite—Hard facing materials—Haynes Stellite Co., Kokomo, Ind.
HCPF—High-carbon steel electrodes for wear-resistant welds — Harnischfeger Corp., Milwaukee
Herco—Transformer type A.C. arc welders —Hercules Elec. & Mfg. Co., Inc., 2416 Atlantic, Brooklyn, N. Y.
Herculite—Lightweight arc welding helmets —Dockson Corp., 3839 Wabash, Detroit
Herculoy — Bronze welding rods — Revere Copper & Brass Co., Inc., 230 Park Ave., N. Y. C.
Hevikoat—Steel, shield arc welding rod—Universal Power Corp., 4300 Euclid Ave., Cleveland
Hicarweld—High carbon steel welding rod—Steel Sales Corp., 3348 S. Pulaski Rd., Chicago
High Speed—Resistance welding contactors —Square D. Co., 4041 N. Richards, Milwaukee
Hi Speed—Gas welding and cutting apparatus—Dockson Corp., 3839 Wabash, Detroit
Hi-Steel—Steel—Inland Steel Co., Chicago
High Tensile — Coated electrodes — Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Hi-Test—Coated bronze welding rod—Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Hi-Wave—Electrostatic, stored energy spot welders—Taylor-Winfield Corp., Warren, Ohio
Hobalum—Aluminum welding rod—Hobart Bros. Co., Troy, Ohio
Hobart—Electric welding equipment and accessories—Hobart Bros. Co., Troy, Ohio
Hobart A.C.—Electrodes for use with A.C. welders—Hobart Bros. Co., Troy, Ohio
Hobart D.C. Lite—Electrodes for D.C. shielded arc welding on sheet metal 16 to 22 gauge—Hobart Bros., Troy, Ohio
Hobart No. 55—Coated electrodes—Hobart Bros. Co., Troy, Ohio
Hobart No. 55 H.T.—High tensile steel electrodes—Hobart Bros. Troy, Ohio
Hobart No. 77T—Mild steel, shielded arc electrodes—Hobart Bros. Co., Troy, Ohio
Hobart No. 88—High speed welding electrodes—Hobart Bros. Co., Troy, Ohio

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Who . . . **Makes It**

Hobart No. 89-HT—Heavily coated, steel electrodes for flat welding in deep-groove joints—Hobart Bros. Co., Troy, Ohio

Hobroduct—Heavily coated, cast iron electrodes—Hobart Bros. Co., Troy, Ohio

Hobronz—Phosphor bronze rod for welding copper

Holdark—Carbon welding electrodes—Speer Carbon Co., St. Mary's, Pa.

Hol-Grip—Electrode holder—Tweco Products Co., English at Ida, Wichita, Kansas

Hollup—Electrodes and welding rods—National Cylinder Gas Co., 205 W. Wacker, Chicago

Hornet—D.C. arc welder—Wilson Welder & Metals Co., Inc., 60 E. 42nd St., N. Y. C.

Hot Spot—Gas lighter—Universal Power Corp, 4300 Euclid, Cleveland

Hycarb—High carbon welding rod—Universal Power Corp., 4300 Euclid, Cleveland

Hydromatic—Portable hydraulic spot welding guns and fixtures—Progressive Welder Co., 3050 E. Outer Dr., Detroit

Hymag—Short fiber, ground asbestos filler—Foote Mineral Co., 1622 Summer, Philadelphia

I

Ideal—Welding helmets, lens for welding and clear cover lens—Ideal Face Shield Co., 468 N. Garfield, Columbus, Ohio

Ideal—Arc welding handshields—Welding Engineering Co., 2872 N. 41 St., Milwaukee

Ignitron—Timing equipment for resistance welding machines—Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

Illium Alloys—Corrosion resisting alloys—Burgess-Parr Co., Freeport, Ill.

Imperial—Welding & cutting torches, regulators, welding rods, accessories for welding and cutting—Imperial Brass Mfg. Co., 1200 W. Harrison, Chicago

Inconel—Corrosion resistant alloy; 79.5% nickel, 13% chromium, 6.5% iron—International Nickel Co., Inc., 67 Wall St., N. Y. C.

Inconel-Clad Steel—Steel plate to which thin, uniform layer of inconel is completely bonded—International Nickel Co., Inc., 67 Wall St., N. Y. C.

Independent—Acetylene and oxygen producing plants, cylinders and accessories—Independent Engrg. Co., Inc., O'Fallon, Ill.

Industro—Welding glass—Willson Products, Inc., 2nd & Washington, Reading, Pa.

Ingaclad—Stainless clad steel (sheets & plates)—Ingersoll Steel & Disc Division, 310 S. Michigan, Chicago

Intensarc—Carbon welding electrodes—National Carbon Co., Inc., Madison & W. 117th, Cleveland

Ironclad — Welding goggles — Chicago Eye Shield Co., 2300 Warren Blvd., Chicago

Ironweld—Special fluxed electrodes—Steel Sales Corp., 3348 S. Pulaski, Chicago

Isorod—High impact, high abrasion electrode—The Resisto-Loy Co., 127 Baylis S.W., Grand Rapids, Mich.

J

Jackson—Electrode carriers, face shields, electrode holders, and lenses—Jackson Products, 3265 Wight St., Detroit

Jessop Silver-Ply—Stainless-clad steel—Jessop Steel Co., Washington, Pa.

Jewel—Pipe welding clamps—Jewel Mfg. Co., 1844 University Ave., St. Paul, Minn.

JJ—Hot work die steel—Jessop Steel Co., Washington, Pa.

Jo-Mac—Welders' gloves, etc.—C. Walker Jones Co., Belfield & Armstrong, Germantown, Philadelphia

Jorgenson—Various type steel bar clamps—Adjustable Clamp Co., 426 N. Ashland, Chicago

Joule—Spot welder—Federal-Mach. & Welder Co., Warren, Ohio

Jumbo—Heavy duty cutting torch—Harris Calorific Co., 5501 Cass Ave. N.W., Cleveland

K

Kam-Klamps — Cam actuated pressure clamp and aircraft clamp—Knu-Vise, Inc., 16841 Hamilton, Detroit

Kathode—Mild steel electrode — Lincoln Electric Co., Cleveland

Keleket—X-ray equipment — Kelly-Koett Mfg. Co., Covington, Ky.

Kellerflex—Flexible shaft equipment—Pratt & Whitney Divison, Niles-Bement-Pond Co., Hartford, Conn.

Keystone Nu-Metal—Electrode holder — F. R. Faulk, 405 Penn Ave., Pittsburgh

K-G—Welding and cutting torches and accessories—K-G Welding & Cutting Co. Inc., 519 W. 29th, N.Y.C.

Klampacto—Toggle action "C" clamp—Knu-Vise, Inc., 16841 Hamilton, Detroit

Kleanweld—Fluxes—K-G Welding & Cutting Co. Inc., 519 W. 29th St., N.Y.C.

K Monel — High strength, non-magnetic form of monel—International Nickel Co., Inc., 67 Wall St., N.Y.C.

Knock-Out—A.C. welders—K. O. Lee Co., Aberdeen, S. D.

Knu-Line—Hinged base clamp—Knu-Vise, Inc, 16841 Hamilton, Detroit

Knu-Lok—Toggle pliers — Knu-Vise, Inc., 16841 Hamilton, Detroit

Knu-Vise — Welding clamps, pliers and wrenches—Knu-Vise, Inc., 16841 Hamilton, Detroit

Koldpoint—Electrode cooling system for resistance welding equipment—American Elec. Fusion Corp., 2610 Diversey, Chicago

Kop-R-Arc—Shielded copper welding electrodes for metallic arc welding copper, copper alloys, cast iron & steel—Krembs & Co., 669 W. Ohio, Chicago

Koro—Welding electrode — Una Welding, Inc., 1615 Collamer Ave., Cleveland

Kraftguard—Chipping goggles — Chicago Eye Shield Co., 2300 Warren Blvd., Chicago

Kromeweld—Stainless Steel Welding flux—Air Reduction Sales Co., 60 E. 42nd St., N.Y.C.

K R Monel—High carbon, nickel, copper aluminum alloy—International Nickel Co., Inc., 67 Wall St., N.Y.C.

Kromox—Chrome nickel welding rods and electrodes—Central Steel & Wire Co., 4545 S. Western, Chicago

Kwikflux—Soldering flux — Special Chemicals Corp., 30 Irving Pl., N.Y.C.

Kwik-Klamp — Adjustable toggle clamp — Danly Machine Spec. Co., 2130 S. 52nd Ave., Chicago

L

Lamite—Hard facing electrodes—Vanadium Alloys Steel Co., Pittsburgh

Larkin—A.C. welders and accessories—Larkin Lectro Prod. Corp., 220 Taaffe Place, Brooklyn, N.Y.

Layeraloy—hard surfacing metal — Eld Metal Co., Ltd., 1233 E. 63rd, Los Angeles

Lay-Rite—Hard surfacing metal—Eld Metal Co., Ltd., 1233 E. 63rd, Los Angeles

Lectro-Welder—A.C. welder—Larkin Lectro Prod. Corp., 220 Taaffe Pl., Brooklyn, N.Y.

Ledloy—Steel—Inland Steel Co., Chicago

Le Jay—D.C. electric arc welders and electric brazing outfits—Le Jay Mfg. Co., 2900 Emerson Ave., S., Minneapolis

Lekkote—Cast iron electrode—Central Steel & Wire Co., 4545 S. Western, Chicago

Lektrox Swedox—Welding electrodes—Central Steel & Wire Co., 4545 S. Western, Chicago

Lenape "Red Man"—Forged steel products—Lenape Hydraulic Press. & Forg. Co., Lenape, Penn.

Liberty—Arc welding helmets — Welding Engineering Co., 2872 N. 41st, Milwaukee

Lightweld—Light gauge steel electrodes—Lincoln Electric Co., Cleveland

Lincoln—Electric arc welding equipment and accessories—Lincoln Electric Co., Cleveland, Ohio

Line-Arc — Welder contactors (magnetic type) — Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland

Linde—Oxygen—Linde Air Prod. Co., 30 East 42nd St., N.Y.C.

Linkem—Automatic connector for single conductor welding cables—Major Engrg. Wks., 312 2nd, Des Moines, Iowa

Lion—Carbon tool steels—Jessop Steel Co., Washington, Pa.

Litecote — Mild steel, coated electrode — Harnischfeger Corp., Milwaukee

Little Pal—Acetylene generator — Modern Engrg. Co., Inc., 3401 Pine, St. Louis

Lloyd—Solders and fluxes—Lloyd S. Johnson, 2241 Indiana, Chicago

Locro — Low chromium steel electrodes—Crucible Steel Co. of America, 405 Lexington Ave., N.Y.C.

Lo-Flo—Silver solder — Goldsmith Bros. Smel. & Refin. Co., 58 E. Washington, Chicago

Luminarc—Aluminum welding rod — Universal Power Corp., 4300 Euclid, Cleveland

Luxiflux—Non-oxidizing gas corrective flux—Special Chemicals Corp., 30 Irving Pl., N.Y.C.

Lyon—Welding benches—Lyon Metal Prod., Inc., Aurora, Ill.

M

Macklin—Grinding wheels — Macklin Co., Jackson, Mich.

Macoloy—Brazing and welding alloy rods—McCauley Alloy Sales Co., 123 W. Madison St., Chicago

Magbond—A colloidal gelatinous binder and lubricant—Foote Mineral Co., 1622 Summer St., Philadelphia

Magic—Shock-resisting steel—Jessop Steel Co., Washington, Pa.

Magnaflux — Magnetic method of welding inspection and equipment — Magnaflux Corp., 25 West 43rd St., N. Y. C.

Magnolia—Oxy-acetylene welding and cutting equipment and accessories—Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.

Majestic—A.C. Arc Welders — Majestic Welder Mfg. Co., 2 East 27th, Minneapolis

Major—Rubber covered, flexible, single conductor welding cable—Welding Engineering Co., 2872 N. 41st, Milwaukee

Mall—Flexible shaft equipment and portable power tools—Mall Tool Co., 7740 S. Chicago, Chicago

Mallory—Silver solders—P. R. Mallory & Co., 3029 E. Washington, Indianapolis, Ind.

Mallory Metals (Numbered) — Resistance welding electrode material—P. R. Mallory & Co., 3029 E. Washington, Indianapolis, Ind.

Manco—Phosphor bronze electrode — Eld Metal Co., Ltd., 1233 E. 63rd, Los Angeles

Manganal — Manganese nickel electrodes—Stulz-Sickles Co., 91 N. J. Railroad Ave., Newark, N. J.

Manganarc—Manganese welding rod—Universal Power Corp., 4300 Euclid, Cleveland

Manganend 13—13% manganese electrode—Arcos Corp., 401 N. Broad St., Phila., Pa.

Mangano—Manganese steel welding rod—Hobart Bros. Co., Troy, Ohio

Manganox—Manganese base welding electrodes—Central Steel & Wire Co., 3000 W. 51st St., Chicago

Manganox—Manganese oxide—Foote Mineral Co., 1622 Summer St., Philadelphia

Manganweld—Manganese steel electrodes—Lincoln Electric Co., Cleveland

Mankote—Coated manganese welding electrodes—Central Steel & Wire Co., 3000 West 51st St., Chicago

Marquette—A.C. arc welders — Marquette Mfg. Co., Minneapolis

Marquette Arc Torch—Attachment for A.C. and D.C. welders to produce independent welding and heating flame—Marquette Mfg. Co., Minneapolis

Marvel—Brazing flux—Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.

Maurath — Flux-coated, alloy-steel electrodes—Maurath, Inc., 7309 Union Ave., Cleveland

Mayari R—Low-alloy, high tensile steel—Bethlehem Steel Co., Bethlehem, Pa.

McCabe—Flanging machines—McCabe Mfg. Co., 9 Water St., Lawrence, Mass.

McKay—Shielded-arc welding electrodes—McKay Co., 1005 Liberty Ave., Pittsburgh

Meco — Acetylene, oxygen, oxy-acetylene equipment and accessories — Modern Engrg. Co., Inc., 3401 Pine Blvd., St. Louis

Meltomatic—Paste solder and paste tin—Wayne Chem. Prod. Co., 9800 Copeland, Detroit

Mercury—Three-Phase X-ray generator—Picker X-Ray Corp., 300 4th Ave., N. Y. C.

Metalayer — Metal spray — Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.

Metal-Bond—Compounds, fluxes and alloys for welding, brazing and soldering—Metal-Bond Mfg. Co., 3201 Kossuth, St. Louis

Metalklad — Welding lenses — American Agile Corp., 5806 Hough, Cleveland

Metcalite—Abrasives for metal spraying surface preparation—Metallizing Engrg. Co., Inc., 21-07 41st. Ave., Long Island City, N. Y.

Metco—Metal spraying equipment—Metallizing Engrg. Co., Inc., 21-07 41st. Ave., Long Island City, N. Y.

Metro—Gas welding torches and welding accessories—Acetylene & Oxygen Supply Co., Inc., 30-30 Northern Blvd., Long Island City, N. Y.

For Details See Your Copy of The Welding Encyclopedia or Write The Manufacturer Direct

Who . . . Makes It

Micro-Weld—Electric butt and spot welding machines—Micro Prod. Co., 20 N. Wacker Dr., Chicago
Midwest—Welding fittings—Midwest Pip. & Supp. Co., Inc., 2nd & Barry, St. Louis
Milburn—Oxy-acetylene cutting and welding equipment and accessories—Alexander Milburn Co., 1424 W. Baltimore St., Baltimore, Md.
Miles—Portable acetylene generators. Oxy-acetylene welding and cutting equipment and supplies—John R. Miles, Inc., Prescott, Wis.
Miller—Reactance arc welders—Miller Electric Mfg. Co., Inc., Appleton, Wis.
Mixend—Cast iron electrode—Arcos Corp., 401 N. Broad St., Philadelphia
M & L—Welding goggles—Chicago Eye Shield Co., 2300 Warren Blvd., Chicago
Mogul—High speed steel—Jessop Steel Co., Washington, Pa.
Mogul—Metallizing gun & equipment—Metallizing Co. of America—562 W. Washington, Chicago; 1351 E. 17th, Los Angeles
Molex—Low alloy electrode—Metal & Thermit Corp., 120 Broadway, N. Y. C.
Moly-C-Alloy—Electrodes for welding carbon molybdenum and low alloy, high tensile steels—Anthony Carlin Co., 2717 E. 75th, Cleveland
Moly-Nickel—Cast iron welding rod—Steel Sales Corp., 3348 S. Pulaski, Chicago
Mo-Mang—Welding rod for build-up welding—American Manganese Steel Division, Chicago Heights, Ill.
Monarch—Filter and welding lenses—Fibre-Metal Prod. Co., 5th & Tilghman, Chester, Pa.
Monarch — Welding helmets and hand shields—The Fibre-Metal Prod. Co., 5th & Tilghman, Chester, Pa.
Monarch—Cutting torch—Harris Calorific Co., 5501 Cass Ave., N.W., Cleveland
Monarch—Navy specification lens—Welding Engineering Co., 2872 N. 41 St., Milwaukee
Monel—Strong corrosion resistant alloy—67% nickel, 30% copper, 1.4% iron, 1% manganese, .15% carbon — International Nickel Co., 67 Wall St., N. Y. C.
Monel-Clad Steel—Steel plate to which thin, uniform layer of monel is completely bonded—International Nickel Co., Inc., 67 Wall St., N. Y. C.
Monelite—Reinforced grinding and welding goggles—Dockson Corp., 3839 Wabash, Detroit
Morey—Welding and brazing fluxes—Morey Flux & Chem. Co., 1815 Williamson, Wilmington, Del.
Moslo—Electrode processing equipment——Moslo Machinery, Inc., 45th & Superior, Cleveland
Motometer — Pressure gauges — Electric Auto-Lite Co., 405 Lexington Ave., N. Y. C.
Mouldough—Backing-up material — Metal-Bond Mfg. Co., 3201 Kossuth, St. Louis
M. S. A.—Safety equipment—Mine Safety Appl. Co., Pittsburgh
M. S. A.—Lamb Air-Mover—Fume remover —Mine Safety Appl. Co., Pittsburgh
Multi-Stage—Two-stage, gas pressure regulators—Harris Calorific Co., 5501 Cass Ave., N.W., Cleveland
Multivolt—Tapped vitreous enameled resistors—Ohmite Mfg. Co., 4835 W. Flournoy, Chicago
M/W — Welding and cutting equipment, welding rods, electrodes, accessories and supplies—Machinery & Welder Co., 312 N. Loomis, Chicago

N

Nageldinger—Gas pressure reducing devices—John Nageldinger & Son, Inc., 409 E. 91st St., N. Y. C.
Napolitan—Aluminum flux—Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
National—Carbon welding electrodes—National Carbon Co., Inc., Madison & 117th, Cleveland
National—Acetylene, oxygen, hydrogen and nitrogen; and cutting machines—National Cylinder Gas. Co., 205 W. Wacker, Chicago
National—Resistance welding machines—National Elec. Weld. Mach. Co., Bay City, Mich.
National—Calcium carbide—National Carbide Corp., 60 East 42nd St., N. Y. C.
National Weld-Timer—Spot welding timer —National Time & Signal Corp., 603 E. Milwaukee, Detroit
Nemco—Fluxes for brazing & welding cast-iron and aluminum, also weld filler—Northeast Metals Co., 4124 Torresdale, Phila.
Neotrol—Weld timers—Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland
Newarc—Electrodes, helmets, cables, and accessories — Electric Arc, Inc., 152 Jewett, Newark, N. J.
Ni-Castweld—High grade nickel, cast iron welding rod—Steel Sales Corp., 3348 S. Pulaski, Chicago
Nickelchromeight — Electrode — Westinghouse Elec. & Mfg. Co., E. Pittsburgh
Nickelchromtwelve — Electrode — Westinghouse Elec. & Mfg. Co., E. Pittsburgh
Nickelchromeweld—Nickel chrome ferrous electrodes—Lincoln Electric Co., Cleveland
Nickelend—Pure nickel electrode—Arcos Corp., 401 N. Board St., Philadelphia
Nickelmang — Electrode — Westinghouse Elec. & Mfg. Co., E. Pittsburgh
Nickox—Nickel steel for gas welding—Central Steel & Wire Co., 3000 W. 51st St., Chicago
Nico—Cast Iron electrodes—American Arc Welders, Inc., Roseau, Minn.
Nionel—Nickel-copper alloy — International Nickel Co., Inc., 67 Wall St., N. Y. C.
No-Fog — Liquid to prevent fogging of lenses, goggles and spectacles — Carhoff Co., 2050 Kensington Rd., Cleveland
Norbide—Nozzles to pressure blast castings and clean steel parts previous to welding—Norton Co., Worcester, Mass.
Norweld—Low carbon soft, coated copper rod—Steel Sales Corp., 3348 S. Pulaski, Chicago
Noviweld—Plates and lenses for goggles—American Optical Co., Southbridge, Mass.
Nu-Arc—Transformer type welders—Electric Arc, Inc., 152 Jelliff, Newark, N. J.
Numbered Stoodites—A group of cast hard facing rods—Stoody Co.,1134 W. Slauson, Whittier, Calif.
Nusteel — Compounds for cleaning and polishing metals and alloys—NuSteel Co., 1714 S. Ashland, Chicago
Nu-Way—Lighter—Matchless Utilities, 102 Flatbush, Brooklyn
Nywsco—Welding and cutting equipment and supplies—New York Weld. Supply Co., 72 Grand St., N. Y. C.

O

Oakite—Process of cleaning aluminum alloys—Oakite Prod., Inc., 22 Thames St., N. Y. C.
Ohio—Resistance welding nuts, bolts, pins, brackets & bosses—Ohio Nut & Bolt Company, 600 Front St., Berea, Ohio
Ohmite — Resistance coils, rheostats, switches, etc.—Ohmite Mfg. Co., 4835 W. Flournoy, Chicago
Okocord—Rubber sheathed portable wires and cables—Okonite Co., Passaic, N. J.
Okonite—Rubber insulated wires and cables —Okonite Co., Passaic, N. J.
Olympic Bronze — Copper alloy — Chase Brass & Copper Co., Inc., Waterbury, Conn.
Omnigraph—Flame cutting machine — Air Reduction Sales Co., 60 E. 42nd St., N.Y.C.
Osage—Hard facing metal and tungsten carbide metals—Osage Metal Co., Inc., 1413 S. Blackwelder, Oklahoma City, Okla.
Owen—Induction A. C. arc welders—Owen Elec. Co., Fayetteville, N. C.
Oxaluma — Abrasive for steel — Cortland Grind. Wheels Corp., Chester, Mass.
Oxweld—Oxy-acetylene welding and cutting apparatus—Linde Air Prod. Co., 30 East 42nd St., N. Y. C.
Oxygraph—Flame cutting machine — Air Reduction Sales Co. 60 E. 42nd St., N.Y.C.
O. Z.—Solderless welding terminal panel and cable connectors—O. Z. Elec. Mfg. Co., 262 Bond, Brooklyn, N. Y.

P

Page—Welding rods and electrodes—Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Page Allegheny—Stainless welding rods and electrodes—Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Page-Armco—Welding rods and electrodes —Page Steel & Wire Div., American Chain & Cable Co. Inc., Monessen, Pa.
Peer—Spot welders—Pier Equip. Mfg. Co., 502 Cross St., Benton Harbor, Mich.
Peerless—Oxygen & acetylene regulators & torches—Welders Supply & Mfg. Co., 108 W. Central Pky., Cincinnati
Penn Bronze — Doubly-deoxidized bronze welding rod—Titan Metal Mfg. Co., Bellefonte, Pa.
Perfection—Line of mild steel, cast iron and alloy steel electrodes—Anthony Carlin Co., 2717 E. 75th, Cleveland
Perfection—Bar clamps — Cincinnati Tool Co., Norwood, Cincinnati
Perfection—Ground clamp—Tweco Products Co., English at Ida, Wichita, Kansas
Pesco—Copper welding rods & fluxes—Perry Equip. & Supply Co., 1515 W. Thompson, Philadelphia
P & H Hansen—Electric arc welders, welding generators, trailer welders—Harnischfeger Corp., 4400 W. National, Milwaukee
P & H—Metallic electrode holders, welding electrodes and welding positioners—Harnischfeger Corp., 4400 W. National, Milwaukee
Phos-Copper—Brazing copper — Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
Phosphor Bronze—Phosphor bronze welding rods—American Brass Co., Waterbury, Conn.
Pier—Welding timers—Pier Equip. Mfg. Co., 502 Cross St., Benton Harbor, Mich.
Pierce—Gas engine governors—Pierce Governor Co., Anderson, Ind.
Planeweld — Electrodes for chromemoly steel, such as is used in air-craft—Lincoln Electric Co., Cleveland
Polygraph—Flame cutting machine—Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Pony—Steel bar clamp fixtures and malleable iron "C" clamps—Adjustable Clamp Co., 426 N. Ashland, Chicago
Poroseal—Compound for filling pin holes, hair line cracks, etc. in cast iron welds—Electric Weld. Mach. Co., 9635 French Rd., Detroit
Por-Os-Way—Grinding wheels—A. P. de-Sanno & Son, Inc., Phoenixville, Pa.
Positive Arc—Resistance current controlled A.C. arc welder—Welding Apps. Co., 2750 W. Van Buren, Chicago
PQ—Silicates of soda—Philadelphia Quartz Co., 125 S. 3rd, Philadelphia
Premier—Welding wires—American Steel & Wire Co., Cleveland
Press E-Z—Hobbing steel—Jessop Steel Co., Washington, Pa.
Pressure Breaker—Attachment for converting regulator to 2 stage type—K-G Weld. & Cutting Co., Inc., 519 W. 29th, N. Y. C.
Prest-O-Lite—Dissolved acetylene, air-acetylene torches and other appliances—Linde Air Prod. Co., 30 East 42nd St., N. Y. C.
Prest-O-Weld—Oxy-acetylene welding and cutting apparatus—Linde Air Prod. Co., 30 East 42nd St., N. Y. C.
Producter—Welding positioner — Bentley Weldery, Inc., 211 Riegel, Syracuse, N. Y.
Progressive—Stationary and portable type electric spot welders. Also portable, hydraulic welding gun units—Progressive Welder Co., 3050 E. Outer Dr., Detroit
Pulmosan—Respirators and safety equipment—Pulmosan Safety Equip. Co., 176 Johnson, Brooklyn, N. Y.
Puritan—Oxygen, hydrogen and acetylene—Puritan Comp. Gas Corp., 2012 Grand Ave., Kansas City, Mo.
Purox—Oxy-acetylene welding and cutting apparatus—Linde Air Prod. Co., 30 East 42nd St., N. Y. C.
Pyro—Flat-file type lighter—Safety Gas Lighter Co., Lynn, Mass.

Where Company Name Precedes Trade Name, See Under Trade Name For Listing

For Details See Your Copy of The Welding Encyclopedia or Write The Manufacturer Direct

Who . . . Makes It

Q

Qiklink—Connector for joining two cables on end—Burndy Engrg. Co., 107 Eastern Blvd., New York, N. Y.
Qiklug—Wrench installed, clamp type lug—Burndy Engrg. Co., 107 Eastern Blvd. New York, N. Y.
Qiktap—Compact T-connector for cables—Burndy Engrg. Co., 107 Eastern Blvd. New York, N. Y.
Quikcet—Double action "C" clamps—Grand Specialties Co., 3117 W. Grand Ave., Chicago

R

Rabin—Welders gloves—Rabin Glove Co., 407 Grove St., Jersey City, N. J.
Radiac—Grinding wheels and abrasive cut-off machines—A. P. deSanno & Son, Inc., Phoenixville, Pa.
Radiagraph—Flame cutting machine—Air Reduction Sales Co., 60 E. 42nd St., N.Y.C.
Railkote—Hard facing electrode—Central Steel & Wire Co., 3000 W. 51st, Chicago
Railox—Hard facing welding rods and electrodes—Central Steel & Wire Co., 3000 W. 51st, Chicago
Ranalloy — Hard surfacing electrodes — Bergstrom Alloys Corp., Reno, Nev.
Ransome—Welding positioner — Ransome Concrete Machy. Co., Dunellen, N. J.
Ray-Ban—Welders' helpers' goggles—Bausch & Lomb Opt. Co., Rochester, N. Y.
Readyweld—Electrodes for A. C. welding—Lincoln Electric Co., Cleveland
Red Devil—Electrode for downhand quality welds on mild steel—Champion Rivet Co., Cleveland, O.
Red Devil 75—Electrode for downhand welding of 70,000 p.s.i. steels—Champion Rivet Co., Cleveland, O.
Red Devil—Cement coated resistors—Ohmite Mfg. Co., 4835 W. Flournoy, Chicago
Red Drum—Calcium carbide—National Carbide Corp., 60 E. 42nd St., N. Y. C.
Red Head—Welding clamps with concealed threads—Chicago Boiler Co., 1965 Clybourn, Chicago
Red Head—Acetylene generators—Harris Calorific Co., 5501 Cass Ave., N.W., Cleveland
Redhead (Tweco)—Ground Clamp—Tweco Products Co., English at Ida, Wichita, Kan.
Red-Rod—Steel welding electrodes—Marquette Mfg. Co., Minneapolis
Reformend — Cast iron electrode — Arcos Corp., 401 N. Broad St., Philadelphia
Rego—Gas welding and cutting torches, regulators and economizers — National Cylinder Gas Co., 205 W. Wacker, Chicago
Rego—Gas equipment, welding rods and electrodes, fluxes and accessories—Bastian-Blessing Co., 4201 W. Peterson, Chicago
Regolator — Gas pressure regulator — Bastian-Blessing Co., 4201 W. Peterson, Chicago
Resisto-Loy—High corrosion and abrasion, resistant alloy—The Resisto-Loy Co., 127 Baylis S. W., Grand Rapids, Mich.
Rex—Welding cable — National Cylinder Gas Co., 205 W. Wacker, Chicago
Rezistal — Stainless electrodes — Crucible Steel Co. of America, 405 Lexington Ave., N. Y. C.
Rido Ray—Welder's goggles—Harry Buegeleisen, Inc., 181 Pacific, Brooklyn, N.Y.
Riehle—Hydraulic testing machines—Riehle Testing Machine Division, American Machine & Metals, Inc., East Moline, Ill.
Riteohm—Precision resistors—Ohmite Mfg. Co., 4835 W. Flournoy, Chicago
Roebcoat — Welding electrodes — John A. Roebling's Sons Co., Trenton, N. J.
Roebling — Welding rods, electrodes and welding cable—John A. Roebling's Sons Co., Trenton, N. J.
Rolex—Hard facing electrode—Metal & Thermit Corp., 120 Broadway, N. Y. C.
Rol-Man—11-14% Manganese steel electrodes — Manganese Steel Forge Co., Richmond & Castor, Phila.
Roman—Bronze welding rods—Revere Copper & Brass Co., Inc., 230 Park Ave., N. Y. C.
Round File—Gas lighter — Safety Gas Lighter Co., Lynn, Mass.
Royal—Surface hardening powder—Anti-Borax Comp. Co., Ft. Wayne, Ind.
Ruemelin—Welding fume collector—Ruemelin Mfg. Co. 3880 N. Palmer, Milwaukee
Ryerson—Welding rods, electrodes and steel products—Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago

S

Safe-T-Chek—Regulators — Modern Engrg. Co., Inc., 3401 Pine Blvd., St. Louis
Safety Grip-Lok—Grinding wheels—Safety Grind. Wheel & Mach. Co., Springfield, Ohio
Safe-Weld—Arc and oxy-acetylene products —Welding Engineering Co., 2872 N. 41, Milwaukee
Safront—Weld and sequence timers for resistance welding machines — Square D. Co., 4041 N. Richards, Milwaukee
Satinarc—Lightly coated steel electrode—Universal Power Corp., 4300 Euclid, Cleveland
Sciaky — Resistance welding machines—Sciaky Bros., 11001 Cottage Grove, Chicago
Scorfill—Alloy used to fill scored cylinders—Smith Weld. Equip. Corp., 2633 4th St., S. E., Minneapolis
Scrulug—Lug with pressure strip that slides up and down to prevent conductor damage—Burndy Engrg. Co., 107 Eastern Blvd., N. Y. C.
Scully—Electrodes, welding rods, electrode holders, helmets and accessories—Scully Steel Prod. Co., 1319 Wabansia, Chicago
S-D Heaters—Preheating and stress relieving—Electric Arc, Inc., 152 Jelliff, Newark, N. J.
Seaco—Hard facing electrodes—Stulz-Sickles Co., 91 N. J. Railroad Ave., Newark, N. J.
Sealkrax—Filler material—Modern Engrg. Co., Inc., 3401 Pine Blvd., St. Louis
Seal-X-O—Filler for rough and porous welds—Metal-Bond Mfg. Co., 3201 Kossuth, St. Louis
Servit—Service connector to accommodate two conductors—Burndy Engrg. Co., 107 Eastern Blvd., New York, N. Y.
Sharonsteel—Products of Sharon Steel Corp.—Sharon Steel Corp., Sharon, Pa.
Shawinigan—Calcium carbide—Shawinigan Prod. Corp., Empire State Bldg., N. Y. C.
Shield-Arc—Arc welders and a series of high tensile electrodes—Lincoln Electric Co., Cleveland
Shoot-A-Lite—Torch lighter—Shoot-A-Lite Corp., 118 E. 28th, N. Y. C.
Shrader—Gasoline and gas-driven portable arc welders. Electro-magnets for alligning and positioning welded jobs—F. W. Shrader Co., 5788 Washington, Culver City, Cal.
Sight Feed—Portable acetylene generators, A.C. electric arc welders. Soldering and brazing torches—Sight Feed Generator Co., Richmond, Ind.
Sil-Fos—Silver Brazing alloy—Handy & Harman Co., 82 Fulton St., N. Y. C.
Silfram—Chromium, nickel, carbon alloys—Stoody Co., Whittier, Cal.
Silfram—Chromium, nickel carbon hard facing alloy—Stoody Co., Whittier, Cal.
Silk Hat—Fluxes and tinning compound—Alwarth Chemical Corp., 580 5th, N. Y. C.
Simplex—Hight tensile welding rod—Air Reduction Sales Co , 60 E. 42nd St., N.Y.C.
Simplex—Metallic electrode holder—Fibre-Metal Prod. Co., 5th & Tilghman, Chester, Pa.
Simplex—Jacks for all industrial purposes—Templeton, Kenly & Co., 1020 S. Central Ave., Chicago
Skilsaw—Portable electric grinders, sanders and tools—Skilsaw, Inc., 4763 Winnemac, Chicago
Smith—Welding and cutting torches, regulators, arc welders, welding rods, electrodes, etc.—Smith Weld. Equip. Corp., 2633 4th St., S. E., Minneapolis
Smith-Dolan—System of pre-heating with a-c hysteresis induction coils—Electric Arc, Inc., 152 Jelliff, Newark, N. J.
Smithway—A.C. electric arc welders, electrodes, fume collectors, automatic arc welding heads, etc.—A. O. Smith Corp., Milwaukee
Smootharc—Electric welding equipment and process of welding with this equipment—Harnischfeger Corp., 4400 W. National, Milwaukee
S-M-S—Ejector type holders, spotholder tips, projection and flash welder dies and seamwelder wheels—S-M-S Corp., 1165 Harper Ave., Detroit
Socket-End Weldolet—Stock fitting for welded piping systems—Bonney Forge & Tool Wks, Allentown, Pa.
Softarc—Lightly coated steel electrodes—Universal Power Corp., 4300 Euclid, Cleveland
Soft-Ironweld — Coated iron electrodes—Steel Sales Corp., 3348 S. Pulaski, Chicago
Softweld—Cast iron electrodes — Lincoln Electric Co., Cleveland
Solder It—Cast iron brazing flux—York Engrg. Co., 3611 Ogden Ave., Chicago, Ill.
Solfrunt—3000 lb. high pressure oxygen gauges—United States Gauge Co., 44 Beaver St., N. Y. C.
Southern Oxygen — Compressed gases, welding rods, electrodes and accessories, Southern Oxygen Co., Inc., Arlington, Va.
Spatter-Ban—Coated glass cover plates—Kimball Safety Prod. Co., 7314 Wade Pk. Ave., Cleveland
Spatter-Ex—Spatter preventive — Wayne Chemical Prod. Co., 9800 Copeland, Detroit
Spatter-Nox—Spatter preventive — Universal Power Corp., 4300 Euclid, Cleveland
Spatter-Off—Spatter preventive—Universal Power Corp., 4300 Euclid, Cleveland
Speedarc—Power factor welder—Ideal Elec. & Mfg. Co., Mansfield, Ohio
Speed King—Cutting torch—Harris Calorific Co., 5501 Cass Ave., N.W., Cleveland
Speed-O-Matic — Automatic arc welding wire—Allied Weld-Craft, Inc., Indianapolis, Ind.
Speedomatic—Mild steel automatic arc welding wire—Steel Sales Corp., 3348 S. Pulaski, Chicago
Speedox—Low carbon welding rod—Central Steel & Wire Co., 3000 W. 51st St., Chicago
Speer—Blocks, paste, electrodes, brushes—Speer Carbon Co., St. Mary's, Pa.
Spekwite—White finish plating salts—Special Chemicals Corp., 30 Irving Pl., N.Y.C.
Spekyello—Yellow bronze plating salts—Special Chemicals Corp., 30 Irving Pl., N. Y. C.
Sperry—Electric flash butt welder for rails—Sperry Prod., Inc., 1505 Willow St., Hoboken, N. J.
Spe-Weld — Low-temperature welding & brazing rods & fluxes; stainless steel electrodes; machineable cast iron electrodes; electrode holders—Special Welding Alloy Co., 27-26 Jackson Ave., Long Island City, N. Y.
Splicit—Automatic line splice for joining wire or cable—Burndy Engrg. Co., 107 Eastern Blvd., N. Y. C.
Spotless—Coated cover lense — Universal Power Corp., 4300 Euclid, Cleveland
Sprababbit—Spraying babbit for metallizing work—Metallizing Engrg. Co., Inc., 21-07—41st Ave., L. I. City, N.Y.
Sprabrass—Spraying brass for metallizing work—Metallizing Engrg. Co., Inc., 21-07—41st Ave., L. I. City, N.Y.
Sprabronze—Spraying bronze for metallizing work—Metallizing Engrg. Co., Inc., 21-07—41st Ave., L. I. City, N.Y.
Sprairon—High purity iron wire for metallizing work. Metallizing Engrg. Co., Inc., 21-07—41st Ave., L. I. City, N.Y.
Square D—Resistance Welding Controls—Square D. Co., Milwaukee
Stable-Arc—Goggles, cables, dipped electrodes, etc.—Lincoln Electric Co., Cleveland
Staidarc—Steel, bare and lightly coated welding rod—Universal Power Corp., 4300 Euclid, Cleveland
Stainarc—Stainless steel welding rod—Universal Power Corp., 4300 Euclid, Cleveland
Stain-Craft—Electrodes for welding chrome and nickel stainless steel and chromium iron—Allied Weld-Craft, Inc., Indianapolis, Ind.
Stainkote—Shielded arc coated electrode for welding stainless steel—Central Steel & Wire Co., 3000 W. 51st St., Chicago
Stainlend—Stainless steel electrodes—Arcos Corp., 401 N. Broad St., Phila.
Staino—Stainless steel electrodes—Hobart Bros. Co., Troy, Ohio
Stainox—Stainless steel for gas welding —Central Steel & Wire Co., 3000 W. 51st St., Chicago
Stain-Rod—Stainless steel electrodes—Marquette Mfg. Co., Minneapolis
Stainweld—Stainless steel electrodes—Lincoln Electric Co., Cleveland
Standard — Carriage clamps — Cincinnati Tool Co., Norwood, Cincinnati
Stanley—Electric grinders—Stanley Elec. Tool Div., New Britain, Conn.
Ste-D-Arc — Electrode holder — Modern Engrg. Co., Inc., 3401 Pine Blvd., St. Louis
Steel-Grip—Welder's gloves, mitts, sleeves, vests, and protective clothing—Industrial Gloves Co., 201 Garfield Blvd., Danville, Illinois
Steelkote—Coated electrodes—Central Steel & Wire Co., 3000 W. 51st St., Chicago
Steiner—Electrode drying ovens—Steiner-Ives Co., 16 Avenue L, Newark, N. J.
Stellite—Hard facing materials, Haynes Stellite Co., Kokomo, Ind.
Sterbon—Grinding wheels—Sterling Grind. Wheel Div., Tiffin, Ohio

For Details See Your Copy of The Welding Encyclopedia or Write The Manufacturer Direct

Who . . . Makes It

Sterlith—Grinding wheels—Sterling Grind. Wheel Div., Tiffin, Ohio
Stoodex—Tungsten, chromium, carbon hard facing alloy—Stoody Co., Whittier, Cal.
Stoodite—Chromium, manganese zirconium carbon hard facing alloy—Stoody Co., Whittier, Cal.
Stoodites Numbered — Cobalt, chromium, tungsten, molybdenum, vanadium, carbon alloys—Stoody Co., Whittier, Cal.
Stoody A.C.—Chromium, carbon, iron hard facing alloy—Stoody Co., Whittier, Cal.
Stoody Self Hardening—Chromium, manganese, carbon hard facing alloy—Stoody Co., Whittier, Cal.
Stow—Flexible shaft machines and grinders —Stow Mfg. Co., 7 Shear St., Binghampton, N. Y.
Strikeasy—Arc welder for fabrication of aircraft tubing and all thin gauge metals —General Elec. Co., Schenectady, N. Y.
Stroco—Flux-plated welding electrodes and electric arc crater eliminator—Karl Strobel Corp., 4700 Santa Fe, Los Angeles
Sulcoat—Bare electrode with Sulcoat finish —Hobart Bro. Co., Troy, Ohio
Superclamp—Forged steel clamps—Cincinnati Tool Co., Norwood, Cincinnati
Superior — Oxy-acetylene equipment and acetylene generators—Superior Oxy-acetylene Mach. Co., 1102 High St., Hamilton, Ohio
Superior—Arc welding handshields—Welding Engineering Co., 2872 N. 41, Milwaukee
Superior Weld—Portable acetylene generator—Welders Supply & Mfg. Co., 108 W. Central Pky., Cincinnati
Supero-Siameez—Welding hose — Electric Hose & Rubber Co., Wilmington, Del.
Super Service—Flexible, portable welding wires and cables—General Cable Corp., 420 Lexington Ave., N. Y. C.
Super-Tough—Welding goggle lens—Willson Prod., Inc., 2nd & Washington, Reading, Pa.
Superweld—Heavy coated, protected arc type electrodes—Steel Sales Corp., 3348 S. Pulaski, Chicago
Supraloy — Hard surfacing electrodes — Bergstrom Alloys Corp., Reno, Nev.
Suregrip—Electrode holder—Martin Wells, 5886 Compton, Los Angeles
Sureweld—Oxy-acetylene welding and brazing fluxes—National Cylinder Gas Co., 205 W. Wacker, Chicago
Sureweld—Electrodes and welding rods—National Cylinder Gas Co., 205 W. Wacker, Chicago
Surface Saving—Hard facing electrodes—Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Surfaceweld—Fine-grained alloyed powder for hard facing in thin layers—Lincoln Elec. Co., Cleveland
S.W.—Electrodes—Westinghouse Elec. & Mfg. Co., E. Pittsburgh
Swedox — Welding rods — Central Steel & Wire Co., 3000 W. 51st St., Chicago
Swift — Resistance welding equipment—Swift Elec. Welder Co., 6560 Epworth Blvd., Detroit
Switfweld—General purpose electrodes—Lincoln Electric Co., Cleveland
Syncro-Break — Synchronized resistance welding contactors—Square D. Co., 4041 N. Richards, Milwaukee

T

Tanarc—Synthetic titanium zirconium mineral—Foote Mineral Co., 1622 Summer St., Philadelphia
Tantung—patented alloy containing tantalum and tungsten carbide; and welding rods, cutting tool tips, etc.—Fansteel Metallurgical Corp., North Chicago, Ill.
Taylor-Winfield—Resistance welding equipment — Taylor-Winfield Corp., Warren, Ohio
Tellurium — Arc welding cable — General Electric Co., Schenectady, N. Y.
Tempil — Temperature recording pellets — Tempil Corp., 132 W. 22nd St., N. Y. C.
Tens-O-Matic—Automatic welding wire—Allied Weld-Craft, Inc., Indianapolis, Ind.
Tensox — Carbon steel for gas welding — Central Steel & Wire Co., 3000 W. 51st St., Chicago
Thomson—Electric resistance welding machine—Thomson-Gibb Elec. Weld. Co., Lynn, Mass.
Thor—Portable electric tools—Independent Pneu. Tool Co., 600 W. Jackson, Chicago
Thor Bantam—Portable pneumatic grinder —Independent Pneu. Tool Co., 600 W. Jackson, Chicago
Thredolet—Stock fitting for welded piping systems—Bonney Forge & Tool Wks., Allentown, Pa.
3C—High carbon-high chrome die steel—Jessop Steel Co., Washington, Pa.
Thyrotron — Resistance welding timers — General Electric Co., Schenectady, N. Y.
Timang—Nickel manganese electrodes, castings, and rolled plate—Taylor-Wharton Iron & Steel Co., Easton, Pa.
Timaxx—Heat Resistant Manganese Steel — Taylor-Wharton Iron & Steel Co., Easton, Pa.
Tinal—Flux powder for fluxing and tinning —American Solder & Flux Co., 2152 E. Norris, Phila.
Tin-Ezy—Tinning compound for tinning metals—Lloyd S. Johnson, 2241 Indiana Ave., Chicago
Tinol—Solder in paste form—American Solder & Flux Co., 2152 E. Norris, Phila.
Tirex—Rubber-sheathed cords and cables—Simplex Wire & Cable Co., Cambridge, Mass.
Titan—Bronze welding alloys—Titan Metal Mfg. Co., Bellefonte, Pa.
Titanalba—Pure titanium dioxide—Foote Mineral Co., 1622 Summer St., Phila.
Titan Bronze—Doubly deoxidized bronze welding rod—Titan Metal Mfg. Co., Bellefonte, Pa.
Titan Manganese Bronze — Doubly-deoxidized manganese bronze welding rods—Titan Metal Mfg. Co., Bellefonte, Pa.
Titan Wearwell Bronze—Special purpose bronze welding rod—Titan Metal Mfg. Co., Bellefonte, Pa.
Titekote—Manganese nickel electrodes—Stulz-Sickles Co., 91 N. J. Railroad Ave., Newark, N. J.
Tobin Bronze—Bronze welding rod—American Brass Co., Waterbury, Conn.
Tombac—Flux for brazing brass, bronze or copper—Morey Flux & Chem. Co., 1813 Williamson St., Wilmington, Del.
Toncon — Corrosion-resisting (copper-molybdenum) alloy iron—Republic Steel Corp., Cleveland
Tool-Craft—Tool steel welding electrodes—Allied Weld-Craft, Inc., Indianapolis, Ind.
Toolweld—Tool electrodes for renewing cutting edges of tools—Lincoln Electric Co., Cleveland
Torchweld—Gas welding and cutting torches and regulators, flame blasting equipment, acetylene generators, flame treating equipment, welding and brazing fluxes—National Cylinder Gas Co., 205 W. Wacker, Chicago
Torit—Soldering, brazing, preheating torches; fume exhausters; and dust collectors—Torit Mfg. Co., 270 Walnut, St. Paul
Tournaweld—Arc welding electrodes—R. G. LeTourneau, Inc., Peoria, Ill.
Tractograph—Flame cutting machine—Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Transweld—Electrodes for A.C. Welding—Lincoln Elec. Co., Cleveland
Travograph—Flame cutting machine—Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Trindl—A.C. electric arc welders—Trindl Prod. Co., 2227 S. Calumet, Chicago
Trojan — Welding goggles — Chicago Eye Shield Co., 2300 Warren Blvd., Chicago
Truform—Non-shrinkable alloy steel—Jessop Steel Co., Washington, Pa.
Trumark — Protractor designed to mark angles on pipe—Tru-Line Corp. , 3051 Rosslyn, Los Angeles
Tube Borium—Tungsten carbide hard-facing rod—Stoody Co., Whittier, Cal.
Tube Turn—Welding fittings—Tube-Turns, Inc., Louisville, Ky.
Tufcord—Power cable—Welding Engineering Co., 2872 N. 41, Milwaukee
Tuffaloy — Resistance welding electrodes and accessories—Welding Sales & Engrg. Co., 8750 Grinnell, Detroit
Tulca—Safety lens and safety goggles—Tulca Division, Univis Lens Co., Dayton, Ohio
Tuline—Welding hose—Modern Engrg. Co., Inc., 3401 Pine Blvd., St. Louis
Tung-Alloy—High heat and abrasion resistant alloy—Resisto-Loy Co., 127 Baylis S.W., Grand Rapids, Mich.
Turretype—Arc welding helmets—Dockson Corp., 3839 Wabash, Detroit
Tweco—Electrode holders, cable lugs, ground clamps, ground hooks and cable connectors—Tweco Products Co., English at Ida, Wichita, Kansas
Twentieth Century — A.C. arc welders — Twentieth Century Welder Mfg., 6 E. 27th, Minneapolis
2B—Hot work die steel—Jessop Steel Co., Washington, Pa.

U

Una—Automatic welding heads, automatic electric welding wire and manual welding electrodes—Una Welding, Inc., 1615 Collamer, Cleveland
Union—Carbide—Linde Air Prod. Co., 30 E. 42nd St., N. Y. C.
Unionmelt—Automatic electric welding process and equipment used—Linde Air Prod. Co., 30 E. 42nd St., N. Y. C.
Unique—Preheating torches—Unique Mfg. Co., Inc., 221 W. Walton, Chicago
Universal — Spot welders, arc welders, holders, safety equipment and accessories —Universal Power Corp., 4300 Euclid, Cleveland
Universal Pressure—Welding and cutting torches—Harris Calorific Co., 5501 Cass Ave. N.W., Cleveland
U.S.—A.C. arc welders and electrode holders—U.S. Elec. Welder Corp., 1224 W. Bancroft St., Toledo
U. S. — Oxygen and acetylene gauges — United States Gauge Co,, 44 Beaver, N. Y. C.
USS—Steel and Stainless steel in sheets, plates, structural shapes, etc.—Carnegie-Illinois Steel Corp., Pittsburgh
U.S.S.—Stainless steel—American Steel and Wire Co., Rockefeller Bldg., Cleveland

V

Vac-U-Clamp — Aid for stiffener-to-plate welding—Glenn-Roberts Co., 1009 Fruitvale, Oakland, Cal.
Vanco—Electrostatic, condenser discharge, butt welders — Taylor-Winfield Corp., Warren, Ohio
Versi-Lirk—Connector for joining conductors on end or parallel to each other or at any angle—Burndy Engrg. Co., 107 Eastern Blvd., N. Y. C.
Versi-Lug—Clamp type lug—Burndy Engrg. Co., 107 Eastern Blvd., N. Y. C.
Versi-Tap—Connector for accommodating large range of wires or cables—Burndy Engrg. Co., 107 Eastern Blvd., N. Y. C.
Vertex—Mild steel electrode for overhead and vertical welding—Metal & Thermit Corp., 120 Broadway, N. Y. C.
Vibro-Arc—Electrode holder with a solenoid vibrating device in the head—Glenn-Roberts Co., 1009 Fruitvale, Oakland, Cal.
Vicepress—Combination hydraulic vice and press—Studebaker Machine Co., 9 S. Clinton, Chicago
Vicphosco—Phosphor bronze electrodes—Victor Equip. Co., 844 Folsom, San Francisco
Vicsilco—Silicon bronze electrodes—Victor Equip. Co., 844 Folsom, San Francisco
Victor—Gas welding and cutting apparatus, including regulators for special purposes —Victor Equip. Co., 844 Folsom, San Francisco
Victor—Welders and welding cable—Victor Weld. & Mfg. Co., 66 Mangin, N. Y. C.
Vulcan — Carbon arc electrode holder — Fibre-Metal Prod. Co., 5th & Tilghman, Chester, Pa.

W

W-Al-Co—Fluxes, electrode holders, welding lenses and aluminum electrodes — Welding Alloys Mfg. Co., 744 Broad St., N. Y. C.
Wall—Oxygen and acetylene—Liquid Carbonic Corp., 3100 S. Kedzie, Chicago
Washington — Carbon tool steels — Jessop Steel Co., Washington, Pa.
Wasp—D.C. arc welder—Wilson Welder & Metals Co., Inc., 60 E. 42nd St., N. Y. C.
Waverless Flame—Two-stage oxygen regulator—K-G Weld. & Cutting Co., Inc., 519 W. 29th St., N. Y. C.
Wear-Craft—Manganese-nickel, hard surfacing electrodes—Allied Weld-Craft, Inc., Indianapolis, Ind.
Wear Devil—Hard surfacing rod—Champion Rivet Co., E. 108 & Harvard, Cleveland
Wearever—Scratch brush—Universal Power Corp., 4300 Euclid, Cleveland
Wearweld—Hard facing electrodes—Lincoln Elec. Co., Cleveland
Weld-A-Cast—Acetylene welding and brazing fluxes—Cortland Weld. Comp. Co., Cortland, N. Y.
Weld-Craft — Hard surfacing electrodes — Allied Weld-Craft, Inc., Indianapolis, Ind.
Welders Pal—Eye drops for relief of eye burns caused by welding flashes—Carhoff Company, 2050 Kensington Rd, Cleveland

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Who . . . Makes It

Welderule — Electrode selector — General Electric Co., Schenectady, N. Y.

Weldex — Resistance welding machines — Weldex, Inc., 7326 McDonald, Detroit

Weld-Fast—Bronze welding rods—Revere Copper & Brass Co., Inc., 230 Park Ave., N. Y. C.

Weld Flux Scaler—Chipping and peening equipment—Dallett Co., 165 W. Clearfield St., Phila.

Weldit—Welding and cutting torches, accessories, etc., and automatic blowpipe. —Weldit Acetylene Co., 638 Bagley Ave., Detroit

Weldite — Electrodes and welding rods — Chicago Steel & Wire Co., 103rd & Torrence, Chicago

Weldmaster — Welding torch — Modern Engrg. Co., Inc., 3401 Pine Blvd., St. Louis

Weldmore—Carbon electrodes for automatic welding—Lincoln Elec. Co., Cleveland

Weldolet—Stock fitting for welded piping systems—Bonney Forge & Tool Works, Allentown, Pa.

Weldomatic—Automatic arc welding head, control and machines — Westinghouse Elec. & Mfg. Co., E. Pittsburgh

Weld-O-Trol—Seam and spot welder contactor control — Westinghouse Elec. & Mfg. Co., E. Pittsburgh

Weld-O-Tron—Electronic arc welder, A.C. (low current, 5 to 75 amp.)—Allis-Chalmers Mfg. Co., Milwaukee

Weld-Prober—Machine for removing sections from butt-welded joints for physical, chemical and visual inspection—Fibre-Metal Prod. Co., 5th & Tilghman, Chester, Pa.

Weldrite—Arc and resistance welders; arc electrode holders and weld filler—Electric Weld. Mach. Co., 9635 French Rd., Detroit

Welshade—Helmets, lenses and goggles—Welsh Mfg. Co., 177 Nassau, Brooklyn, N. Y.

Weltronic — Resistance welding timers — Weltronic Corp., 3080 S. Outer Dr., Detroit

Westinghouse—Electric arc welding equipment—Westinghouse Elec. & Mfg. Co., E. Pittsburgh

Wharton—High pressure gas cylinders for oxygen, hydrogen, etc.—Taylor-Wharton Iron & Steel Co., Easton, Pa.

White Flash—Extruded, flux coated electrodes—Central Steel & Wire Co., 3000 W. 51st St., Chicago

Wiese World Brand—High carbon reclaiming units—Wilse Plow Welding Co., 1507 5th St., Perry, Ia.

Willson — Goggles, masks, shields, etc. — Willson Products, Inc., 2nd & Washington, Reading, Pa.

Willsonite—Tinted, super-tough glass for welding goggles—Willson Products, Inc., 2nd & Washington, Reading, Pa.

Willson-Weld—Glass for welding goggles and helmets—Willson Products, Inc., 2nd & Washington, Reading, Pa.

Wilson—Arc welders, electrodes and accessories—Wilson Welder & Metals Co., Inc., 60 E. 42nd St., N. Y. C.

Windsor Special—High carbon-high chrome die steel—Jessop Steel Co, Washington, Pa.

Wingfoot—Corrugated welding hose—Goodyear Tire & Rubber Co., Akron, Ohio

Wirewatt—1-watt wire wound resistors—Ohmite Mfg. Co., 4835 W. Flournoy, Chicago

Wodack—Portable electric grinders—Wodack Elec. Tool Corp., 4627 W. Huron, Chicago

X

XL—Welding lens—Sellstrom Mfg. Co., 630 N. Aberdeen, Chicago

Xtra Lite—Cover lens—Sellstrom Mfg. Co., 630 N. Aberdeen, Chicago

XX Special—Various types welding rods—K-G Weld. & Cutting Co., Inc., 519 W. 29th St., N. Y. C

Y

Yellow Jacket—D.C. arc welder—Wilson Welder & Metals Co., Inc., 60 E. 42nd St., N. Y C

York—Cast iron brazing flux, tinning compound and boiler and radiator compound —York Engrg. Co., 3611 Ogden, Chicago

Z

Zephyr—X-Ray generator for continuous industrial operation—Picker X Ray Corp., 300 4th Ave., N. Y. C.

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Commonwealth Prod. Co., 118 N. 23rd
Ebbert & Kirkman Co., Brown Marx Bldg.
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Young & Vann Supply Co., 1731 1st, No.

MOBILE
Central Electric Co., St. Louis St.
McGowan-Lyons Hdwe. & Sup. Co., 113 No. Water St.
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VICTOR EQUIPMENT CO.,
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155 N. Commerce St.

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Allen & Jemison Co., 620 Greensboro Ave.
The Battery Shop, 2327 Seventh St.

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PHOENIX
Arizona Welding Equip. Co., 230 S. Central
McConkey-Docker & Co., Inc., 130 S. Madison St.
Motor Supply Co., 315 N. Central Ave.
Pratt-Gilbert Co., 701 S. 7th St.

VICTOR EQUIPMENT CO.,
Arizona Welding Equipment Co.
230 So. Central Ave.
Welders Supply Co.

PRESCOTT
Arizona Mining Supply Co.

ARKANSAS

FORT SMITH
Arkansas Supply Co., North 10th & "A"

HELENA
Lewis Supply Co., Inc., 421 Ohio St.

LITTLE ROCK
Arkansas Mill Supply Co.
A. E. Baker, 2003 Louisiana St.
Central Supply Co.
Crow-Burlingame Co., 400 Spring St.
Lyons Machinery Co.
Welders Supply Co., 608 Thomas St.

VICTOR EQUIPMENT CO.,
Welders Supply Company,
608 Thomas Street

CALIFORNIA

BAKERSFIELD
Hopper Machine Works, Inc., 2315 M
McCarthy Tank & Equip. Co., 1428 L
Victor Welding Equip. Branch, 905 18th

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Eureka Automotive Sup. Co., 4th & I Sts.

FRESNO
Automotive Parts Co., 1317 Van Ness Ave.
L. R. Edminster, 928 H St.

GLENN-ROBERTS CO.,
S. J. Sigler,
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S. J. Sigler, 1828 Los Angeles St.
Stuart Oxygen Co., 1832 Mono
Victor Equipment Co., 251 North H St.

GILROY
Montgomery Auto Parts, 198 N. Monterey

HANFORD
Valley Oxygen Co.

HAYWARD
Scott's Auto Parts, 574 Castro St.

HUNTINGTON PARK
Home Oxygen Co., 2074 Laura Ave.

LONG BEACH
Long Beach Welders Supply Co., 1282 W. Anaheim St.
H. I. Tullis, 1101 E. Anaheim

LOS ANGELES
Anderson Equipment Co., 644 E. Florence
E. D. Bullard Co., 1229 S. Olive St.
Ducommun Metals & Supply Co., 219 E. Central Ave.
Eld Metal Co., 1233 E. 63rd St.

GLENN-ROBERTS CO.,
Anderson Equipment Co.,
644 E. Florence Ave.

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GLENN-ROBERTS CO.,
Harron, Rickard & McCone Co.,
3850 Santa Fe Ave.

GLENN-ROBERTS CO.,
Sullivan-Cassimus,
110 W. Pico Blvd.
M. N. Farr & Sons, 1755 W. Santa Barbara
J. C. Gowing Welding, 1007 S. Santa Fe
Harron, Rickard & McCone, 2205 Santa Fe
Robert M. Hartwell Co., 353 E. 2nd St.
Hopper Machine Works, 2315 M
Johnston Welding Equip. Co., 1845 E. 57th
Kay-Burbank, 18th & Hope Sts.
Keystone Tool & Supply Co., 7720 Maie
Meyer Machy. Co., 1939 South Santa Fe
Moore Machy. Co., 2051 South Santa Fe
Percival Steel & Sup. Co., 4600 S. Santa Fe
Petroleum Equip. Co., 2800 S. Alameda
Smith Booth Usher Co., 2001 Santa Fe
Karl Strobel Corp., 4700 Santa Fe
Stuart Oxygen Co., Branch, 5700 So. Alameda
Sullivan Cassimus Co., 110 W. Pico Blvd.
Torch Supply & Eng. Co., 1637 E. Vernon
Union Hdwe. & Metal Co., 411 E. First
United Supply Co., 6205 Wilmington
Victor Equipment Co., 3821 Santa Fe
Weldcraft Serv. & Sup. Co., 1566 E. Slauson
Welding Equipment Co., 109 E. 11th
Welding Supply Co., 4901 S. Santa Fe

LOS NIETOS
L. J. Paddock Co.

MERCED
Lud's Auto Parts, 737—17th St.

MODESTO
Strong's Auto Parts

MONTEREY
Peninsula Auto Parts

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Butte Tractor Equip. Co., 1001 Del Paso

OAKLAND
Bullock's Equipment Co., 377 Fifth

GLENN-ROBERTS CO., INC.,
1009 Fruitvale Ave.
Industrial Specialties Co., 1009 Fruitvale
Geo. A. Kreplin, 3060 Broadway
C. W. Marwedel, 11th & Alice St.
Oakland Welding Sup. Co., 186 Twelfth St.
Pacific Tool & Sup. Co., 251 8th St.
Stuart Oxygen Co., Branch, 2857 Ettie

PORTERVILLE
Automotive Supply Co.

REDDING
Butte Tractor & Equipment Co.

SACRAMENTO
Henderson Bros., 1501 K Street
Bert Lovell & Son, 1214 17th St.
Newbert Implement Co., 1616 J St.
Thomson-Diggs Co., 3rd & R. Streets

SALINAS
Lacey Auto Parts

CALIF. (CONT'D)

SAN BERNARDINO
Weld-Rite Welding Works, 327 G St.

SAN DIEGO
Chas. N. Bottiger, 209 West Street East
Hazard-Gould & Co., 302 Fifth Ave.
Motor Hdwe. & Equip. Co., 1133 Columbia
Pacific Acetylene Co., 2995 Main St.
San Diego Spring & Brake Works, 220 G
Webb Bros., Ltd., 205—10th Ave.
Western Metal Sup. Co., 215—7th Ave.

SAN FRANCISCO
Baker, Hamilton & Pacific Co., 700—7th St.
E. D. Bullard Co., 275—8th St.
C. F. Bulotti Mach. Co., 829 Folsom

CHICAGO STEEL & WIRE CO.,
553 Howard
Continental Steel & Sup. Co., 833 Harrison
Ducommun Metals & Sup. Co., 656 Townsend
Federal Pipe & Sup. Co., 670—2nd St.
Frazer Co., Ltd., 301 Clay
Gus A. Gehlert, 309 Clementina

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Sullivan-Cassimus,
651 Folsom
Hilo Mfg. Co., 510 Brannan
McCullock Auto Parts, 21st & Valencia Sts.
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National Welding Equip. Co., 223 Main
Roberts Equipment Co., 819 Harrison
Stone Ryals Elec. & Mfg. Co., 470 Natoma
Stuart Oxygen Co., 211 Bay
Sullivan Cassimus Co., 651 Folsom

VICTOR EQUIPMENT CO.,
844 Folsom
Jos. Wagner Mfg. Co., 441 Folsom
Welding Service Sales, Inc., 954 Howard

SAN JOSE
Farmer's Union, 151 W. Santa Clara
Ranieri Welding Sup. Co., 1141 S. 1st St.
San Jose Hdwe. Co., 62 W. San Fernando

SANTA ANA
V. B. Anderson Co., 120 Spurgeon

STOCKTON
Austin Bros., 361 S. Aurora
Hickinbotham Bros., Ltd., 536 Aurora
Moore Equipment Co.

TURLOCK
Starr's Auto Parts, 218 No. Broadway

VALLEJO
National Auto Parts, 1135 Sonora

VISALIA
Automotive Sup. Co., Main & Garden Sts.

WHITTIER
Stoody Co.

COLORADO

DENVER
Acetylene Service Co., 1105 Zuni
Denver Oxygen Co., 1160—10th St.
Dillon Hdwe. & Implement Co., 1734—15th St.
M. L. Foss, Inc., 1901 Arapahoe
Hendrie & Bolthoff Mfg. & Sup. Co., 1635—17th St.

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DENVER, COLO. (CONT'D)

Intermountain Belting & Packing Co., 1414 W. Wazee
Intermountain Trading Co., 1319 E. 17th
Johnson Supply Co., 1414 W. Wazee
Mine & Smelter Supply Co., 99 Cordova
Peterson Company, 1921 Blake
Rockfield-Davis Equip. Co. Central Savings Bank Bldg.
United States Welding Co., 1325 Market
Urquhart Service, 1600 Blake

VICTOR EQUIPMENT CO.,
Western Welding Supply Co.,
1534—16th St.
Western Welding Supply Co., 1534—16th

PUEBLO
N. O. Nelson Co.

CONNECTICUT

BRIDGEPORT
Oxy-Acetylene Supply Co., 710 Main
Parsons Bros., 31 E. Washington
C. F. Seaburg Welding Co., 86 Lesbia

FAIRFIELD
Williamson Bros., Inc., 726 Post Rd.

HARTFORD
Nutmeg Auto Supply Co., 159 Park
Presto Battery Serv., Inc., 48 Edwards
Thos. Trant & Bros., 228 State St.

MERIDEN
Church & Morse, Inc., 45 S. Colony St.

NEW HAVEN
Alfred B. King & Co., 141 River St.
C. S. Mersick & Co., 278 State St.
New England Weld. Sup. Co., 405 Chappel
Oxy-Acetylene Supply Co., 394 Crown St.
Page Steele & Flagg Co., 30 Prout St.
Silver Seal Products Co., 80 State St.

NEW LONDON
Auto Battery & Electric Co., 95 Truman

SO. MERIDEN
Conn. Gas Products Co.

WATERBURY
American Brass Co.

WILLIMANTIC
Windham Welding Supply

DELAWARE

WILMINGTON
Delaware Compressed Gas Co., 3rd & Greenhill Ave.
Delaware Hdwe. Co., 2nd and Shipley
Keen Compressed Gas Co., 3305 Market St.
Morey Flux & Chem. Co., 1815 Williamson
James B. Wilson, 108 Western (Elsmere)

DISTRICT OF COLUMBIA

Central Armature Wks., Inc., 625 D St. N. W.
L. S. Julien, Inc., 1443 "P" St. N. W.
Noland Co., Inc., 136 "K" St. N. E.
Horace T. Potts Co., Woodward Bldg.
Smith Welding Equip., 1835—14th St., N. W.
Standard Automotive Sup. Co., 1835—14th St., N. W.

FLORIDA

JACKSONVILLE
Cameron & Barclay Co.
J. G. Christopher Co., 416 East Bay St.
Farquhar Machinery Co., 720 W. Bay St.
Georgia Supply Co., 821 E. Bay St.
Standard Bearings & Parts Co., 1541 Main
Ward Engineering Co.

VICTOR EQUIPMENT CO.,
Wright Supply Company,
816 Ocean St.

Ward Engr. Co., 657 E. Bay St.
Wright Supply Co., 816 Ocean St.

MIAMI
Cameron & Barclay Co.
Holden-Wood, Inc, 2010 N. Miami Ave.
Miami Parts & Spring Co., Inc., 37 N. W. Fourth St.
Welding Supplies Co., 3016 No. Miami Ave.

TAMPA
Cameron & Barclay Co., 107 S. Franklin
Epperson & Co., 130 S. Franklin St.
Weeks Equipment Co., 141 S. Franklin St.

GEORGIA

ALBANY
Albany Hdwe & Mills Sup. Co.

GEORGIA (CONT'D)

ATHENS
H. T. Huggins & Son

ATLANTA
R. S. Armstrong & Bros. Co., 676 Marietta
Bird-Potts Co., 1495 Pryor St., S. W.
Boykin Tool & Sup. Co., 130 Mtta. N. W.
Owen W. Conrad Co., 181 Spring St., S. W.
John A. Dodd, 101 Mtta, N. W.
Fulton Supply Co., 342 Nelson St., S. W.
D. B. Hunt Welding Equip. Co.
Machinery, 845 Memorial Dr., S. E.
Southern Iron & Equip. Co., Hemphill Ave.
J. M. Tull Metal & Sup. Co., 285 Marietta St., N. W.

VICTOR EQUIPMENT CO.,
Machinery (W. P. Childs),
845 Memorial Dr., S. E.

AUGUSTA
Bearing Parts & Sup. Co., 609 Broad St.
Dixie Auto Supply Co., 646 Broad St.
S. Donald Fortson Co., 564 Reynolds St.

MACON
Stewart-Goette Electric Co., 558 2nd St.
Taylor Iron Wks. & Sup. Co.

SAVANNAH
Georgia Supply Co.
Industrial Electric Co., Inc., 114 W. Bay
Morgans, Inc.
John D. Robinson Co., 13 W. Bay Street
Savannah Ship Chandlery & Sup. Co., Market Dock

VICTOR EQUIPMENT CO.,
Morgans, Inc.,

VICTOR EQUIPMENT CO.,
John D. Robinson Co.,
13 West Bay St.

WEST POINT
Boston Cook Co.

IDAHO

BOISE
Intermountain Equipment Co.
Olson Mfg. Co.,
Sawtooth Co., 710 Front St.

VICTOR EQUIPMENT CO.,
The Sawtooth Company,
710 Front St.

POCATELLO
Paul Roberts Mch. & Supply Co.

WALLACE
Coeur D'Alene Hdwe & Fdry. Co.

ILLINOIS

AURORA
Aurora Welding Serv. Co., 61 S. Water St.
The National Oxygen Co., 122 S. River St.
Jas. F. Paterson, 120 S. Lake

BENTON
Chase Welding Supply Co.
Illinois Gas & Equip. Sales, 106 So. Frisco

CHICAGO
A. & R. Auto Parts Co., 7743 So. Halsted
Acme Welding Supply Co., 5318 S. Kedzie
Allied Weld-Craft, Inc., 341 N. Pulaski
Harry Alter Co., 1728 S. Michigan

REGINALD A. ANDREWS & CO

DETROIT ELECTRODE HOLDER

Ask for Demonstration

427 W. Erie St. Delaware 4629

McCAULEY ALLOY SALES CO.,
Harry Alter Co.,
1728 S. Michigan

CHICAGO, ILL. (CONT'D)

CENTRAL STEEL & WIRE CO.,
3000 W. 51st St.,
Republic 3000

Chicago Steel Serv. Co., 3912 S. Ashland
Chicago Tube & Iron Co., 2531 W. 48th St.
Chicago Welding Sales Co., 3611 W. Ogden
Denton & Anderson Co., 543 W. Washington Blvd.
Economy Weld. Sup. Co., 5528 W. Gladys

GLENN-ROBERTS CO.,
Johnson Welding Equip. Co.,
729 S. Western Ave.

Great Lakes Supply Co., 9342 Ewing Ave.
Robt. W. Hoffman Co., 10 S. Clinton St.
Howard Weld. Sales Co., 2417 N. Ashland
Interstate Machinery Co., 109 S. Clinton
Johnson Weld. Equip. Co., 729 S. Western
Kay Gases, Inc., 7430 S. Ashland

McCAULEY ALLOY SALES CO.,
Fred C. Kramer Co.,
212 N. Jefferson

McCAULEY ALLOY SALES CO.,
Trindl Prod., Ltd.,
2227 S. Calumet

Machinery & Welder Corp., 312 N. Loomis
Metal Parts & Equipment Co., 2400 W. Madison
Mid-States Equip. Co., 2137 S. Wabash
H. K. Miller, 1036 W. Lake St.
Fred Peters, 2612 S. Indiana Ave.
C. E. Phillips & Co., 332 S. Jefferson
Jos. T. Ryerson & Son, Inc., 2558 W. 16th
Scully Steel Prod. Co., 1319 W. Wabansia

SQUIRE F G CO

WELDING AND CUTTING EQUIPMENT

Supplies—Accessories—Repairing

4435 W Madison St COLumbus 2606

Stanco Welder & Sup. Co., 9 S. Clinton

STEEL SALES CORPORATION,
3348 S. Pulaski
Crawford 4400

Trindl Products Co., 2227 S. Calumet

VICTOR EQUIPMENT CO.,
Chicago Welding Sales Company,
3611 Ogden Ave.

Wall Chemicals, Inc., 2054 W. Harrison
Welding Apparatus Co., 4557 W. Diversey

DECATUR
Black & Co.
Wm. L. Oakes Machinery Co.

GALESBURG
P. & M. Accessories Co., 170 S. Seminary

JOLIET
Barrett Hdwe. Co., 324 Henderson Ave.
Joliet Engineering Co., 500 Shelby
Trackman Auto Sup. Co., 458 N. Chicago

KENILWORTH
Pavlick Bros., 554 Green Bay Rd.

LA GRANGE
National Oxygen Co.

MARION

VICTOR EQUIPMENT CO.,
Kimmel Auto Supply,
219 Market Street

MOLINE
Machy. & Welder Corp., Branch, 729 3rd
Moline Welding Serv., 840—3rd
John J. Normoyle Co.
Tri-City Weld. Equip. & Sup. Co., 840—3rd
Zimmer Bros. Co., 309 16th

O'FALLON
C. & R. Engineering Co.

PEKIN
Velde Roelfs & Co., 303 Margaret

PEORIA
Foremost Electric Co., 213 E. Franklin
Hagerty Bros. Co., 923 S. Washington
Hercules Steel Products, 2710 S. Adams
Micro Products Co., S. Bartonville
Peoria Auto Parts Co., 817 S. Adams
Peoria Welding Supply Co., 529 S. Adams

QUINCY
Tenk Hardware Co.

ROCKFORD
Factory Supplies Co., 1528—7th St.
Jos. Behr & Sons, Inc., 1100 Seminary
Olsen Welding & Sup. Co., 411 Chestnut
Rockford Welding Sup. Co., 502 Cedar
Swords Electric Co., 2301 11th St.
Welders Supply Co., 500 N. Madison

SPRINGFIELD
Central Auto Equipment Co.

Where . . . TO BUY IT

INDIANA

ANDERSON
Hopper Automotive Supply Co.

EVANSVILLE
Evansville Supply Co., 810 Pennsylvania
Lex Co., Inc., N. W., Riverside Dr. & Ingle St.
Orr Iron Co., 1100 Pennsylvania

FORT WAYNE
John L. Brown, 124 E. Taber St.
Landenbergh-Hutchens, 612 Meyer Ave.
Mossman-Yarnelle Co.
Wayne Weld. Sup. Co., Inc., 517 E. Wayne

GARY
Big Four Garage, 1076 Washington

HAMMOND
Acme Welding Co., 5507 Calumet Ave.

JOHN G COWELL
Serving Industry in the Calumet District For Over 23 Years
General Distributor
"WILL WELD" Arc Welder (A.C.)
for Hand and "UNIONMELT" Service
District Distributor
"DURO"
Electrode Holders
"FIBRE-METAL"
Helmets
"DYER"
Spot Welders
26 RIDGE ROAD
Munster (Ind.) 296

Standard Equipment & Supply Co.
Welders Supply Co., 4747 Hohman Ave.

INDIANAPOLIS
Acme Oxy-Acetylene Co., 3209 Madison
Acetylene Products Co., 176 So. Harding
Allied-Weld-Craft, Inc., 401 W. South
R. D. Eaglesfield, 323 S. LaSalle
General Weld. Prod. Co., 901 Massachusetts
The Gibson Co., 433 N. Capitol Ave.
W. J. Holliday & Co., 545 W. McCarthy
Indiana Oxygen Co., 435 S. Delaware
Indianapolis Machy. & Sup. Co., 1959 S. Meridian
E. A. Kinsey Co., 725 N. Capitol Ave.
Mineweld Co., 326 E. N. York
State Machinery Co., 31 E. Georgia
Sutton-Garten Co., 401 W. Vermont
Tanner & Co., 409 S. Penn St.
VICTOR EQUIPMENT CO.,
Indiana Oxygen Company,
435 S. Delaware St.
Vonnegut Hdwe. Co., 120 E. Washington

KOKOMO
Moon Weld. & Repair Shop, 316 S. Washington

MARION
G. C. Baber Motor Supply Co.

RICHMOND
Richmond Ind't'l Sup. Co., 187 Fort Wayne
Sight Feed Generator Co., 14 No. 10th
VICTOR EQUIPMENT CO.,
Sight Feed Generator Company,
14 N. Tenth

SOUTH BEND
Ridge Supply Co.
A. J. Schrader & Co., 437 S. Michigan

TERRE HAUTE
Hardware Supply Co.

HOBART ARC WELDERS
P. E. KELLEY, Mgr.
WELDING SUPPLIES
Cable - Holders - Lenses
Electrodes - Helmets - Carbide Generators
ACETYLENE EQUIPMENT
Regulators - Hose - Accessories
Electric & Gas Equipment to Rent
HOBART DISTRIBUTING CO.
WAREHOUSE
13th and Elm — Terre Haute, Ind.
Office Phone C-9226 — Res. Phone H-7029

Mineweld Co., of Indiana, 541 N. 5th
Terre Haute Heavy Hdwe. Co., 545 N. 13th

VINCENNES
Vincennes Welding Co., 715 Hickman

IOWA

CARBON
Perks & Reese Garage, Corning

CEDAR RAPIDS
L. G. Lamb Sales Co., 220 First, N. E.
The Kocena Co.
VICTOR EQUIPMENT CO.,
L. B. Lamb Sales Company,
220 First St., N. E.

DAVENPORT
Harry Alter & Sons, 514 S. Howell
Gierke-Robinson Co., 332 W. 4th
Louis Hanssen's Sons, 215 W. 2nd

DES MOINES
Des Moines Iron Co., West 1st & Vine Sts.
Electrical Eng. & Const. Co., 1225 Walnut
Gibbs Welding Supply Co., 315 Twelfth
Globe Mach. & Supply Co., 205 Court
Herring-Wissler Co., 1212 Locust St.
Major Engineering Works, 312 Second
Munn & Cassady Co., 518 Clifton
Strauss Lock Co., 711 Grand
VICTOR EQUIPMENT CO.,
Gibbs Welding Supply Company,
315—12th Street

DUBUQUE
Crescent Electric Co., 769 Iowa No.
Jacobsen Iron & Metal Co.
Perfection Oil Co., 2605 Rhomberg Ave.

FT. DODGE
Bock Brothers, 111 S. 12th

MASON CITY
Paul J. Barclay

MUSCATINE
Barry Co.

OTTUMWA
Haw Hardware Co.

PERRY
Wiese Plow Welding Co.

SHENANDOAH
VICTOR EQUIPMENT CO.,
Selser Motor Parts
715 W. Thomas Street
Selser Motor Parts, 715 W. Thomas

SIOUX CITY
Pecout Industrial Supply Co.
Sioux City Iron Co.

WATERLOO
Newkirk Sales & Serv. Co., Inc., 417 W. 5th
Superior Welding Works, 820 Jefferson
Welding Supply Co.

KANSAS

ARKANSAS CITY
National Lighting Co., 600 E. Poplar

COFFEYVILLE
Plattner Welding Supply Co., 210 E. 10th

HUTCHINSON
Bunte Welding Supply Co.,
R. & G. Welders Supply Co., 302 S. Main

PITTSBURGH
VICTOR EQUIPMENT CO.,
A. & A. Electric Machinery Company,
1012 North Broadway

SALINA
R. T. Brown Co., 7th & Elm Sts.,
VICTOR EQUIPMENT CO.,
R. T. Brown Company
7th & Elm Streets

TOPEKA
Topeka Arc Welding Co., 212 Jackson St.

WICHITA
General Equipment Co., 311 S. Wichita
Johnson Bros. Auto Sup. Co., 123 N. St. Francis
Northwest Oxy-Acetylene Dist. Co.
Phillips & Easton Sup. Co., 244 S. Wichita
Massey Hardware Co., 357 N. Santa Fe
Watkins, Inc., 710 E. 1st

KENTUCKY

HARLAN
Kieley Electric Co.
Southern Oxygen Co.

HAZARD
Mine Service Co.
Southern Oxygen Co.

LEXINGTON
Wilson Machy. & Sup. Co., 139 N. Mill St.

LOTHAIR
Mine Service Co.

LOUISVILLE
Graft-Pelle Co., 309 W. Main
W. C. Heimerdinger Co.
Industrial Equip. Co., 7th Ave. & Magnolia
Marine Electric Co.
Mineweld Co., 737 E. Broadway
Neill-LaVielle Supply Co., 505 W. Main

BURIED
IN A DESK DRAWER OR FILE CASE . . .

Can be as good as filed in your waste basket. "Waste Basket" files are always kept up to date; whereas most "permanent" files are just fixtures. This issue belongs in neither. It is an easy-to-use reference book answering product and supply questions that come up at the most unexpected moments.

TIME AND AGAIN THERE WILL BE OCCASION TO USE THIS ISSUE

KEEP IT HANDY TO YOUR WORKING DESK

Where . . . TO BUY IT

KENTUCKY (CONT'D)

MIDDLESBORO
Southern Oxygen Co.

PADUCAH
Henry A. Petter Supply Co.

PIKEVILLE
Southern Oxygen Co.

WHITESBURG
Southern Oxygen Co.

LOUISIANA

ALEXANDRIA
L. A. Patterson, 2232 Paris St.

JENNINGS
G. P. Modlish, 451 E. 43rd St.

MONROE
Southern Hardware Co., Ltd.
Weaks Supply Co., Ltd.

NEW ORLEANS
Dixie Mill Supply Co., Tchoupitoulas & St. Joseph Sts.
Equitable Equip. Co., 410 Camp St.
Interstate Electric Co., 643 Magazine St.
Modern Welders Sup. Hse., 1105 Magazine
Wm. D. Seymour Co., Inc., 614 S. Peters
Standard Sup. & Hdwe. Co., 822 Tchoupitoulas
Oliver H. Van Horn Co., Inc. 522 Camp
Woodward-Wight & Co., 451 Howard

SHREVEPORT
Dixie Mill Supply Co., 200 Edwards
Hughes Welding Supply Co., 309 Market
Peerless Supply Co., 601 Cotton St.
Oliver H. Van Horn Co., 228 Spring

VICTOR EQUIPMENT CO.,
Peerless Supply Company,
601 Cotton Street

SULPHUR
Louisiana Supply Co.

MAINE

AUBURN
Maine Oxy-Acetylene Supply Co., 7 Minot

BANGOR
N. H. Bragg & Sons, 74 Broad St.

PORTLAND
B. D. Stanley, 544 Forest Ave.
Suburban Gas Co., 289 Forest Ave.
Utilities Distributors, Inc.

SO. PORTLAND
Bancroft & Martin Rolling Mills

MARYLAND

ANNAPOLIS
Southern Oxygen Co., Inc., Branch

BALTIMORE
L. A. Benson Co., Inc., 6 E. Lombard
T. A. Canty, Inc., 1023 Cathedral
Coggins & Owens, 19 S. Charles
R. J. Loock & Co.
Maryland Oxygen Co., 1700 S. Newkirk
Horace T. Potts Co., Branch, 504 St. Paul
Prest-O-Baltimore Co., 2 East 21st
Puritan Compressed Gas Corp., Race & McComas Sts.
Scully Steel Prod. Co., Bush and Wicomico Sts.
Southern Oxygen Co., Inc., Branch, 1433 W. Hamburg
Trippe Sup. Co., 102 E. Lafayette

VICTOR EQUIPMENT CO.,
Puritan Compressed Gas Corp.,
Race & McComas Strs.

VICTOR EQUIPMENT CO.,
Southern Oxygen Company,
1433 W. Hamburg St.

Welders Supply Co., 700 McCulloh

BEL AIR
Southern Oxygen Co., Inc.

CAMBRIDGE
Southern Oxygen Co., Inc.

CUMBERLAND
McKaig's
Southern Oxygen Co., Inc.
Weimer's Welding Service, Knox and Hay

FREDERICK
Southern Oxygen Co., Inc.

HAGERSTOWN
Southern Oxygen Co., Inc.

MASSACHUSETTS

BOSTON
Acetylene & Elec. Welders Sup. Co., 19 W. 3rd
Joseph Beal & Co., 465 Atlantic Ave.
Braman Dow & Co., 239 Causeway St.
Brown-Wales Co., 493 "C" St.
Chase Parker & Co., 290 Congress
Cutter Wood & Sanderson Co., 222 3rd St.
Eastern Oxygen Co., 412 Medford, Charlestown Dist.
Gas Weld Equipment Co., 26 Cambria
General Weld. & Equip. Co., 791 Tremont

BOSTON, MASS. (CONT'D)

HARVEY STEEL

DISTRIBUTORS OF
MUREX ELECTRODES
REZISTAL
STAINLESS STEEL ELECTRODES
HOBART WELDING MACHINES
MARQUETTE
A-C WELDING MACHINES
WELDING ACCESSORIES
CABLE
60% Rubber Jacket
Welding, Ground, and Power
NATIONAL WELDING CARBON PRODUCTS
VICTOR
METAL CUTTING AND WELDING EQUIPMENT
REVERE
WELDFAST BRONZE WELDING ROD
COMPLETE STOCKS—
—SPEEDY SERVICE
ARTHUR C. HARVEY CO.
BOSTON, MASS.
CALL STADIUM 5000

Littlefield Green Corp., 778 Commonwealth
New England Gas Prod. Co., 27 West St., Charlestown Dist.
Jos. T. Ryerson & Son, Inc., (Branch), 285 3rd St.

SILVER WELDING SUPPLY

WEST ROXBURY, MASS
PARKWAY 5770
N. E. Distributors for
MECO WELDING AND CUTTING APPARATUS
WELDING SUPPLIES
AND ACCESSORIES
LINCOLN-FLEETWELD PRODUCTS
"Everything for Welding"

VICTOR EQUIPMENT CO.,
Arthur C. Harvey Company,
Harvey Steel Road

Welding Engrg. Sales Corp., (Branch) 140 Federal

BROOKLINE
Welders Supply Co., 15 St. Marys

CAMBRIDGE
Austin Hastings Co., Inc., 226 Binney
Garage and Auto Supply Co., 82 Brookline

HIRAM A LERNER

Distributor LINCOLN ELECTRIC CO
LINCOLN SHIELD-ARC WELDERS
FLEETWELD WELDING WIRE
(and all alloys)
STAINLESS STEEL WELDING WIRE CABLE AND ALL ACCESSORIES
Complete Stock — Prompt Shipment
143 Main St—At Kendall Square
Kirkland 8907

MASSACHUSETTS (CONT'D)

EVERETT
Welding Service Co., (Branch), 134 Tremont

GARDNER
Davis Hardware Co., 17 Pleasant St.

LOWELL
Chester B. Ketchen, 207 Moody St.
Lowell Oxy-Acetylene Sup., 251 Mt. Vernon

LYNN
New England Oxalene Gas & Equip., 65 Boston St.,
North Shore Welding Service
Wyoma Welding Co., 65 Boston St.

MILFORD
Haynes Welding Co., 76 E. Main St.

NEW BEDFORD
Jonathan Handy Co., Inc., 28 William
Kempton Oxy-Acetylene Serv., 9 Chestnut

NEWTONVILLE
Suburban Welders Supply Co., 12 Bailey

SO. BOSTON
Leo Gordon, 49-D Street

VICTOR EQUIPMENT CO.,
Leo Gordon
49-D Street

SPRINGFIELD
Austin-Hastings Co., (Branch), 72 Lower Beverly Hills, W. S.
R. Clifford Boyd
Cave Welding Co., 531 Worthington St.
Crescent Transportation Co., 326 Park, W. S.
Electric Motor & Repair Co., 11 Park
Chas. C. Lewis Co., 401 Liberty
Taft Welding Equipment Co., 3218 Main

WEST ROXBURY
Silver Weld. Serv., One Anawan Terrace

WORCESTER
Harry P. Winslow, 35 Vinton
Austin-Hastings Co., (Branch), 146 Union
George F. Blake, Inc., 198 Mechanic
Kerr Welding Co., 19 Jackson St.
Pratt and Inman, 12 Cherry St.
Worcester-Oxy-Acetylene Sup. Co., 755 Southbridge

MICHIGAN

ALPENA
Huron Industries Co.

BATTLE CREEK
G. F. Dillon

BAY CITY
Jennison Hardware Co., 901 N. Water
Valley Oxygen Co., 1123 Washington Ave.
Valley Weld. & Boiler Co., 1317 S. Water

VICTOR EQUIPMENT CO.,
Valley Oxygen Company,
1123 Washington Ave.

DETROIT
W. H. Anderson Co., Inc., 47 Seven Mile Rd., at John R
Bird Gas Corp., 12820 Evergreen Rd.
Boyer Campbell Co., 6540 St. Antoine
Carr-Weller Engrg. Co., 633 Larned St. W.

CENTRAL STEEL & WIRE CO.,
5035 Bellevue Ave.,
Plaza 6780

Denton & Anderson Co., 2857 E. Grand
Detroit Oxygen & Acetylene Co., 6535 Russell
Detroit Stamping Co., 334 Midland Ave.
C. H. Dockson Co., 3839 Wabash
Dura Bilt Welding Co., 2662 Hart St.
Electric Welding Machine Co., 1440 E. Larned

GLENN ROBERTS CO.,
Weldit Acetylene Co.,
638 Bagley Ave.

PELTON-KURTZ SUPPLY CO

Acetylene & Arc Wires
Aluminum—Bronze
Steels: Plain—Stainless
Special Alloys
Regulators—Torches
Safety: Clothing—Goggles
Helmets—Shields
Protect-O-Metal #2
PKCo { 150 / 300 / 500
2609 E. Larned Fitzroy 6960

Where . . . TO BUY IT

DETROIT, MICH. (CONT'D)

Hutchinson Sales Co., 2832 E. Grand
Martin Elec. Co., 3040 E. Outer Dr.
Pelton-Kurtz Supply Co., 2609 E. Larned
C. E. Phillips & Co., 2750 Poplar St.
Robinson Welding Sup. Co., 1951 E. Ferry
Roy Smith Co., 5257 Trumbull Ave.
Smith Welding Equip. & Supply Co., 4300 12th
Spaulding Elec. Co., Inc., 1350 Michigan
STEEL SALES CORPORATION,
5151 Wesson Ave.
Tyler 6-300
Chas. A. Strelinger Co., 149 E. Larned St.
Sure-Weld Co., 2152 E. Larned
VICTOR EQUIPMENT CO.,
Robinson Welding Supply Co.,
1951 E. Ferry St.
Welders Service & Supply Co., 421 Mt. Elliott
Welding Equipment & Sup. Co., 223 Leib
Welding Machines Mfg. Co., 17325 Lamont
Welding Metals Mfg. Co., 122 E. Larned
Welding Sales & Engrg. Co., 8750 Grinnell
Weldit Acetylene Co., 638 Bagley
Weltronic Corp., 2832 E. Grand Blvd.

ESCANABA

Delta Hardware Co.

FLINT

Grandsden-Hall & Co., Walnut & Poplar

GRAND RAPIDS

Grand Rapids Supply Co., 47 Market Ave., S. W.
J. C. Miller Co., 528 Lake Michigan Dr., N. W.
Purity Cylinder Gases, Inc., 721 Division Ave., South
F. Raniville Co.

JACKSON

C. E. Hamlin Co.

KALAMAZOO

Kendall Mill Supply & Hdwe. Co.
Service Cylinder Gas Co., 1115 Fulford
Service Gas Co., 721 Portage

LANSING

Erich Bannasch, 610 N. Larch
Central Welding Co., 214 E. Howard
Lansing Supply Co.

MT. PLEASANT

W. M. Maxwell, 1018 S. Franklin

MUSKEGON

Factory Supply Co., 942 Terrace St.
Lakeshore Machinery & Supply Co., 1922 Peck
Muskegon Hdwe. & Supply Co.
Tupes Spring & Welding Serv., 533 Peck

PLYMOUTH

Bieszk Bros. Co., 37705 Plymouth Rd.

PORT HURON

Shepherd Welding & Sup. Ser., 407 River
South Park Welding Wks., 2624 Conners

SAGINAW

H. L. McLure, Second National Bk. Bldg.
Service Welding Co., 112 Hoyt St.

SAULT STE. MARIE

Soo Hardware Co.

MINNESOTA

DULUTH

Kelley-How-Thompson Co.,
W. P. & R. S. Mars Co., 324 W. Michigan
S. and S. Auto Parts Co.
Western Welder Corp., 21 So. 61st Ave., West

FAIRMONT

Jeff's Bottled Gas Co., 700 E. First St.
D. S. Milne Co.

HIBBING

Lindberg-Maddison Welding Co.

MANKATO

Southern Minnesota Supply Co.

MINNEAPOLIS

Commercial Gas Co., 2633 S. E. Fourth St.

MITCHELL SUPPLY CO

AUTHORIZED MECO SALES AND SERVICE

150 amp, 210 amp, 260 amp, 400 amp, 600 amp, AC arc welders

HELMETS, GOGGLES, CABLE, INS' HOLDERS

Electrodes AC or DC

We repair

227 So 3rd Street

Harry Louis, 228 Washington Ave., No.
Minneapolis Iron Store Co., 528 Washington

MINNEAPOLIS, MINN. (CONT'D)

Minnesota Supply Co., Sexton Bldg.
Mitchell Supply Co., 225 S. Third
Northern Machinery & Sup. Co., 818 Lumber Exchange
F. E. Satterlee Co., 118 Washington N.
STEEL SALES CORPORATION,
529 So. 7th
Thompson-Gibb Electric Welding Co., Sexton Bldg.
Wheel Service Co., 1116 2nd Ave., South
The Williams-Hdwe. Co., 100 2nd Street, North

S. MINNEAPOLIS

R. L. Langford, 527 Seventh St.

ST. CLOUD

St. Cloud Auto Supply Co.

ST. PAUL

Thos. J. Engel, 166 W. 4th St.
W. H. Grohs & Co., 1378 Blair Ave.
Nicols Dean & Gregg, Eighth & Sibley
St. Paul Welding & Mfg. Co., 292 Walnut
Scheffer & Rossum Co., 265 E. Kellogg
Scully Steel Products Co., University & Eustis

MISSISSIPPI

VICKSBURG

O'Neill McNamara, Hdwe. Co., 709 Clay

MISSOURI

CARUTHERSVILLE

Berry Welders Supply Co., 1306 Ward

COLUMBIA CITY

French Co.

JOPLIN

Meyers Motor Supply Co.

KANSAS CITY

AA Electric Machy. Co., 1117 Cherry St.
Barr Thorp Electric Co., 2630 Holmes
Burnidge Distr. Co., 1601 Swift N. K. C.
English Brothers Mach. Co.,
The Faeth Co., 1127 W. 8th St.
Puritan Compressed Gas Corp., 2012 Grand
Reid Sales Corp., 308 E. 17th St.
Standard Asbestos Mfg. & Insul'g Co., 10 N. Olive
Stowe Hdwe & Sup. Co., 1322 W. 13th St.
VICTOR EQUIPMENT CO.,
Puritan Compressed Gas Corp.,
2012 Grand Ave.
Welding Equipment Supply Co., 1617 Walnut
Welders Supply & Repair Co., 510 E. 18th

POPLAR BLUFF

F. G. Holcomb, 623 S. Fifth St.

ST. CHARLES

H. C. Osick & Co.

ST. JOSEPH

Ross Frazer Iron Co.

ST. LOUIS

T. R. Beebe Sales Co., 4928 Forest Park Blvd.
Corby Supply Co., 3942 W. Pine
L. A. Foster Engineering Co., 2519 California St.
GLENN-ROBERTS CO.,
Mineweld Co.,
200 S. Theresa Ave.
HENNE MANUFACTURING CO.,
Industrial Supplies, Inc.,
200 S. Theresa St.
HENNE MANUFACTURING CO.,
Hobart Arc Welding Equipment Co.,
2118 N. Broadway
Hill Equipment Engrg. Co., 4135 Gratiot
Industrial Supplies, Inc., 200 S. Theresa
Machinery & Welder Corp, 700 S. Spring
Mineweld Co., 200 S. Theresa Ave.
Modern Engineering Co., 3411 Pine
Scully Steel Products Co., 21st & Gratiot
Sligo Iron Store Co., 1301 N. Sixth
STEEL SALES CORPORATION,
4565 McRee
Grand 5255
VICTOR EQUIPMENT CO.,
Corby Supply Company,
3942 West Pine Blvd.

SPRINGFIELD

Ozark Motor & Supply Co., 308 S. Jefferson
Springfield Auto Wks., 1501 Boonville

MONTANA

BILLINGS

Great Northern Tool & Supply Co., 2224 Minnesota
Hines Motor Supply

BUTTE

Brack Motor Supply
Montana Hdwe. Co., 823 So. Montana St.
Mountaineer Welder Sup. Co.

GLASGOW

Markle Transfer Co.

KALISPELL

Kalispell Motor Supply

NEBRASKA

LINCOLN

Lincoln Welding Co. 330 S. 10th
Nebraska Boiler Works, 233 N. 9th
The Sidles Co.

NORFOLK

VICTOR EQUIPMENT CO.,
Norfolk Auto Supply,
Cor. 2nd & Braasch

OMAHA

Balbach Co., 1203 California
Baum Iron Co., 13th and Harney Sts.
Consolidated Mach. Supply Co., 1702 Cuming
Cris-Weld Supply Co., 132 Dodge St.
Fuchs Machinery & Sup. Co., 1102 Farnam
Interstate Machinery & Sup. Co., 1006 Douglas
Omaha Welding Co., 1501 Jackson St.

NEVADA

RENO

F. C. Bailey Co.
Nevada Auto Supply Co.
Reno Motor Supply Co., 15 W. Plaza St.

NEW HAMPSHIRE

DERRY

Community Gas Co., Crystal Ave.

MANCHESTER

New Hampshire Welding Sup., 515 Elm
John B. Varick Co., 809 Elm St.

NEW JERSEY

ASBURY PARK

Asbury Auto Supply Co., 913 Asbury
Middlesex Welding Sup. Co., Schultz Bldg.

ATLANTIC CITY

Diehl Welding & Machine Co., 121 N. Michigan
Risley's Automotive Elec. Serv., 5 No. Chelsea

BELLEVILLE

International Factory & Mill Supply

BLOOMFIELD

Herman Yecies, 46 Dodd St.

CAMDEN

H. Edwin Shade Co., 2101 Federal St.
General Motor Supply Inc., 1176 Kaighn
Heimbach's Auto Supply Co., 1025 Mt. Ephraim
H. W. Howe & Son, 311 Vine St.
John Matlack & Son Co., 8th & Vine

CLIFTON

New Jersey Welding Co., 650 Main Ave.

EAST PATERSON

Welding Supply Co., 65 Van Riper

ELIZABETH

J. W. Goodliffe, 651 Grove St.
VICTOR EQUIPMENT CO.,
J. W. Goodliffe,
651 Grove St.

HARRISON

American Oxygen Serv. Corp., 600 Essex

HILLSIDE

National Welding Supply Co., 520 Leo St.

JERSEY CITY

Jersey Oxy-Acetylene, 136 Tonele Ave.
Manning Maxwell & Moore, Inc., 452 Communipay

KEARNY

General Industrial Gas Co., Lincoln Highway.

NEWARK

Alpha Products Co. Inc., 438 Central
Edgcomb Steel Corp., 350 Frelinghuysen
Faitoute Iron & Steel Co., 182 Frelinghuysen
Goodman Electric Mach. Co., 1060 Broad
Grammer Dempsey & Hudson, Inc., 212 Rome St.
Industrial Arc Welding Equip. Co., 185 Ogden St.
Jarrett Compressor & Equip. Co., 275 Central
Chas. W. Kreig Co., Inc., 52-60 Dickerson
Manning Welding & Engrg. Co., 185 Ogden
R. C. Miller, 122 Clinton Ave.
Scully Steel Prod. Co., Ft. of Bessemer
Trex Engineering & Supply Co., McCarter Highway at Mulberry Pl.
Wehrheim Machinery Co., 77 Ogden St.
Welding Alloys Mfg. Co., 744 Broad St.
Welding & Cutting Equip. Co., 51 S. 8th
Welding Service Co., 744 Broad St.

NEW BRUNSWICK

C. Cunnius, 288 George St.
J. D. Heil, 318 George St.
Middlesex Welding Sup. Co., 255 George

Where . . . TO BUY IT

NEW JERSEY (CONT'D)

NORTH BERGEN
Auto Gas Light and Appl. Co., 4965 Blvd.

PASSAIC
Commonwealth Welding Prod. Co. of N. J., 207 Dayton
New Jersey Engrg. & Sup. Co., 577 Main

PATERSON
American Welding Products Co., 15 Prince
H. W. Mills & Co., 59 Washington St.
Wm. Rudolph, 452 Broadway
White & Shauger, Inc., 435 Straight St.

PERTH AMBOY
Melbourn & Ritter
Sprague Service & Sup. Co., 276 Davidson

PLAINFIELD
Jersey Welding Supply Co., 343 E. 3rd St.

RED BANK
Wilson's Welding Sup. Co., 45 John St.

RIDGEFIELD
Melchior, Armstrong, Dessau Co.

TRENTON
J. W. Kennedy, 318 Market St.
Frank Millner Co., 102 N. Olden Ave.
Charles Shick & Co., 153 Hanover, West
Wiley-Hughes Supply Co., 801 New York

NEW MEXICO

ALBUQUERQUE
Contractors' Equip. & Sup. Co., Springer Bldg.

NEW MEXICO STEEL COMPANY
Attractive prices to jobbers
WELDING HELMETS AND LENS
INDUSTRIAL EYESHIELDS
GRINDING GOGGLES
ELECTRODE HOLDERS
FLEXIBLE ELECTRODE CABLE
209 Third Street — Phone 9490

Rio Grande Welding Shop, 613 S. 1st
Valley Welders Supply Co., 215 W. Copper

SILVER CITY
Hamlett Welding Shop
Showalters Welding and Machine Shop

NEW YORK

ALBANY
Albany Calcium Light Co., 287 Hudson
Albany Spring Service, 408 N. Pearl
Albany Welding Supply Co., 173 Montgomery
Detroit Supply Co., 80 Central Ave.
Larkin Equipment Co., 32 South St.
R. B. Wing & Son Corp., 384 Broadway

AMSTERDAM
United Welding Co., 9 Guy Park Ave.

AUBURN
Smith-Pearson Co.
Woodruff & Murphy, 88 Genesa

BINGHAMTON
Binghamton Battery Sales Co., 37 Collier

BROOKLYN
Acetylene & Welding Equip. Co., 1065 Atlantic

ATLAS GAS & SERVICE CORP
WILL BUY
OXYGEN, ACETYLENE, CARBONIC GAS, NITROUS AND PROPANE CYLINDERS, ALL SIZES
State price and condition
472 Sackman St.

Atlas Gas & Service Co., 472 Sackman
Oxy-Acetylene Equip. Co., 830 Humboldt
C. H. Tiebout & Sons, Inc., 31 Grand St.

BUFFALO
Airdrome Welding Co., 313 Herman
American Allsafe Co., 1245 Niagara
Beals McCarthy & Rogers, Inc., 50 Terrace
Buffalo Welding Supply Co., 37 E. Ferry
Enos & Sanderson Co., 147 Bushnell
Peter A. Frasse & Co., Inc., 50 Exchange
General Engineering Co., 1338 West

GLENN-ROBERTS CO.,
R. C. Neal Co., Inc.,
76 Pearl St.

Hebeler Welding Co., 1005 Jefferson
R. C. Neal Co., 76 Pearl St.
Don W. Patterson, Rand Bldg.

BUFFALO, N. Y. (CONT'D)

Root Neal & Co., 64 Peabody St.
H. D. Taylor Co., 99 Oak St.
Welding Engineering Sales Corp., Genesee Bldg.
Welding Equipment Co., of Buffalo, 170 Franklin

CUBA
Cuba Cylinder Gas Co.

ELMIRA
Pipe Welding & Supply Co., 614 William
Quality Vulcanizing Shop, 374 S. Main

FLUSHING
Howard S. Barte, 136-33—37th Ave.

FREEPORT, L. I.
Acetylene & Welding Equip. Co., 38 Newton Blvd.

GLENS FALLS
Mullen Welding Co., 16 Park St.
Taylor Welding Supply Co., 38 Oakland

GLOVERSVILLE
National Welding Co., 16 West St.

BAY SHORE, L. I.
James & Hawkins, Inc.

HEMPSTEAD, L. I.
B. Le Claire 305 N. Franklin St.

ITHACA
C. J. Rumsey & Co.

LOCKPORT
Berent Boiler & Iron Works

LONG ISLAND CITY
Industrial Supply Co. of Long Island, 25-19 43rd Ave.

PREST-O-SALES & SERVICE, INC
WELDING NEEDS
Yes Indeed!
Complete Line of Electric and Gas Welding Equipment and Supplies
Grinding Equipment
Apparatus Repair Dept.
Oxygen—Acet—Carbide
29-23 40 ROAD
LONG ISLAND CITY, N. Y.
Tel ST — 4 6130-1-2

Special Welding Alloy Co., 27-26 Jackson
Whaley Bros., 49-09 Fifth St.

MADRID
Kelly Sales Corp.

MILTON
Walter Smith Battery & Welding Co.

MINEOLA, L. I.
H. S. Barto, Jericho Turnpike

NEW ROCHELLE
County Motor Products, Inc.

NEW YORK CITY
Abeles-Lewit Co., Inc., 161 W. 64th St.
Edwin D. Allmendinger, 15 Moore
Automobile Necessities Co., 521 W. 125th
Betts & Betts Corp., 551 W. 52nd St.
H. Boker & Co., 101 Duane St.
Bronx Hdwe. & Sup. Co., 2737 3rd, Bronx
R. K. Carter & Co., 66 Reade St.
Carter, Milchman & Frank, 139 Spring
Carthage & Jasper, 1133 Broadway
Mr. Scott Childs, 9 Henshaw St.
Commercial Acetylene Sup. Co., 60 E. 42nd
Dodge & Seymour, Ltd., (Exporters) 53 Park Pl.
R. S. Donald, 50 Church St.
Eastern Welding Equip. Co., 17 W. 60th
Peter A. Frasse & Co., Grand & Sixth
Chester F. Gailor, 50 Church St.
General Welding Equip. Co., 167 W. 64th
Goodweld Equipment Co., 639 W. 125th St.
W. R. Grace & Co. (Exporters), Hanover Square
George W. Hoover, 30 Church St.
Independent Welding Supply Co., 268 E. 142nd St.
International Technic, Inc., 381 4th Ave.
Interstate Sales Co., 1123 Broadway
Katz Bros., 610 W. 125th St.
Knickerbocker Welding Supply Co., 409 W. 17th St.
New York Welding Supply Co., 75 Grand
A. F. D. Schrader, 8-10 Bridge St.
Howard U. Searle, 111 8th Ave.
T. W. Smith Co., Inc., 446 W. 54th St.
Tool & Equipment Sup. Co., 370 Lexington
Topping Bros., 159 Varick St.

VICTOR EQUIPMENT CO.,
A. F. D. Schrader,
8-10 Bridge St.

Waters Arc Welding Corp., 254 W. 17th
Welding Engineering Sales Corp., 110 E. 42nd St.
Weldox Equipment Co., 359 W. 52nd St.

NEW YORK (CONT'D)

NIAGARA FALLS
Eagle Welding Equip. Co., 341 1st Ave.

OLEAN
A. E. Ewing & Co.
David Rosen, 202 E. Green St.

PATCHOGUE, L. I.
Alexander Welding Co., 461 E. Main St.

POUGHKEEPSIE
Metropolitan Mfg. Co., 11 No. Bridge St.

ROCHESTER
Barr & Creelman, Mill & Plumb. Supply Co., 224 Main St. W.
Chapin Owen Co., 205 St. Paul St.
Cook Iron Store Co., 128 St. Paul St.
S. B. Roby Co., 208 South St.
O. G. Schwartz, 432 Atlantic Ave.
Welding Supply Co., 510 State St.

ROME
Rome Iron Mills

ST. ALBANS
Metropolitan Welding Sup. Co., 112 Colfax

SCHENECTADY
United Welding Co.

SO. FALLSBURGH
Empire State Welders' Supply Co.

SOUTHAMPTON, L. I.
Suffolk Welding Supply Co., 45 Culver Hill

SPRING VALLEY
A. C. Elener, 22 Hofman St.

STAPLETON, L. I.
Enterprise Welding Wks., 7-9 Sand St.

SYRACUSE
Belt-Rope Supply Co., 500 E. Genesee
Cotet's Welding Sup. Co., 209 W. Willow
Drennan Hdwe. Co., 924 Oswego Blvd.
National Welding Equipment Co., Tracy & Erie Blvd. W.
J. F. Owens Machy. Co., 1804 Erie Blvd. E.
Oxygen Syracuse Co., 117 S. McBride St.
Syracuse Supply Co., 314 W. Fayette St.
Weld. Engrg. Sales Corp., 113 S. Salina
Welding Supply Co., 111 W. Taylor St.

UTICA
Fuller Supply Co., 147 Hotel St.

WATERTOWN
M. E. Avery Co., 268 State St.
Graham Service Co., 208 Mill St.
N. E. Herrick, 411 W. Main St.
Lance Machine & Welding Co., 208 Mill

WELLSVILLE
Albert E. Arnoys, 125 N. Brooklyn Ave.
Southern Oxygen Co.

NORTH CAROLINA

ASHVILLE
Tidewater Supply Co.

BURLINGTON

VICTOR EQUIPMENT CO.,
Kester Machinery Company

CHARLOTTE
Armature Winding Co., 1000 P. & N. RR.
J. W. Fraser & Co., 124 Brevard Court
W. S. Murphy
National Welders Supply Co., 519 Oakland
Textile Mill Supply Co.

DURHAM
Constructors Supply Co., Inc.

ELIZABETH CITY

VICTOR EQUIPMENT CO.,
McPherson Bros. Auto Supply Co.

GASTONIA
Norris Mill Supply Co.

GREENSBORO
Gate City Auto Parts Co.
Southern Oxygen Co.

HIGH POINT
Adams Mills Corp.

VICTOR EQUIPMENT CO.,
Kester Machinery Company

NEW BERN
The Mill Supply Co.

RALEIGH
Motor Bearings & Parts Co.

WARSAW
Welders Equipment & Supply Co.

WHITEVILLE
Columbus Motor Co.

WILMINGTON
Automobile Parts Co.

WINSTON-SALEM

VICTOR EQUIPMENT CO.,
Kester Machinery Co.,
300 East Third St.

NORTH DAKOTA

BISMARCK
Quanrud Brink & Reibold, Inc.

DICKINSON
Vranna Auto Supply

FARGO
Fargo Motor Supply Co.
Reinhard Bros., Inc.

GRAND FORKS
Grand Forks Supply Co.

OHIO

AKRON
Akron Welding & Spring Co., 940 S. High
Manufacturers Rubber & Supply Co., 380 S. Broadway

Where . . . TO BUY IT

OHIO (CONT'D)

ASHTABULA
Arthur Louis Supply Co.

BRIDGEPORT
General Welding Co., 317 W. Main

CANTON
Buckeye Oxygen Co., Louisville Road
Dine-Dewees Co., 511 Twelfth N.E.
Manufacturers Rubber & Supply Co.
Welders Supply Co., 706 Tusc W.

CINCINNATI
CENTRAL STEEL & WIRE CO.,
525 Township Ave.,
Avon 2230
Wm. T. Johnston Co., 214 Vine St.
The Kieley Electric Co., 217 Walnut St.
Miller Equipment Co., 134 Opera Place
Mutual Mfg. & Sup. Co., 2933 Spring Grove

O K I WELDING SUPPLY CO
SMITH'S
Acetylene and Electric Equipment
WESTINGHOUSE—STOODY—AGILE
Electrodes
JACKSON Eyeshields
DURO Electrode Holders
WIESE Replacement Plow Units
Helmets, Goggles, Cable, Hose
EVERYTHING FOR THE WELDER
12 West Court St MAin 3506

Williams & Co., Inc., 1921 Dunlap
The Pickering Hdwe. Co., 440 Main St.
Queen City Supply Co., 201 W. Pearl St.
Larry E. Sherman Co., 1807 Dallas Ave.
Vulcan Copper & Sup. Co., 120 Sycamore
Welders Sup. & Mfg. Co., 108 W. Central

CLEVELAND
Air Products Distr. Co., 11624 Madison
Betz Pierce Co., 1284 E. 53rd St.
Burdett Oxygen Co. of Cleveland, 3300 Lakeside
Spencer W. Butler Co., 2212 Woodhill Rd.
Cedar Welding Service, Inc., 3732 Cedar
Hal H. Clark Co., 2036 E. 22nd St.
Compressed Gases & Welders Supply Co., 1550 E. 66th St.
C. H. Davis Serv. Supply Co., 4815 Detroit
Denton & Anderson Co., Citizens Bldg.
Dessil Tool & Supply Co., 1401 E. 9th St.
Direct Sales & Serv. Co., 13414 Gainsboro
Elliott Elec. Co., 2186 W. 25th St.
Kramer's Oxy-Acetylene Welding Supply, 10710 Nelson
H. L. McCreery & Co., 2036 E. 22nd St.
Mau-Sherwood Supply Co., 800 Lime Rd.
J. M. & L. A. Osborn Co., 1541 E. 38th St.
W. M. Pattison Sup. Co., 777 Rockwell St.
Jos. T. Ryerson & Son, Inc, 5414 Lakeside
Scully Steel Prod Co., 1394 E. 39th
Service Co., 3732 Cedar Ave.
Strong Carlisle & Hammond, 1394 W. 3rd
Torch-Arc Welding & Supply Co., 16916 Detroit Ave.

UNIVERSAL POWER CORP
Universal Arc and Spot Welders Electrodes—Rego Oxy-Acetylene App. Rods
Weld. Supplies—Sight Feed Generators
4300 Euclid Avenue Endicot 6322

VICTOR EQUIPMENT CO.,
H. L. McCreary & Co.,
2036 E. 22nd St.
Welding & Cutting Sup. Co., 2923 Carnegie
White Tool & Supply Co., 1313 W. Sixth
F. A. Wilch, 1514 Prospect Ave.
Williams & Co., Inc. Branch, 3700 Perkins
Yoder Co., 5500 Walworth Ave.

COLUMBUS
Adams Barre Co., 1242 N. High St.
Arc Welding Co., 635 Mt. Vernon
Central Ohio Welding Co., 253 E. Spring
G. W. Holmes Co., 198 E. Gay Street
Milburn Machinery Co., 1057 Goodale Bldg.
Williams & Co., 31 Grant Ave.
Ross Willoughby Co., 269 W. Spring St.

CUYAHOGA FALLS
D. W. Timmerman, 2766 6th St.

DAYTON
CENTRAL STEEL & WIRE CO.,
1095 E. Monument Ave.,
Fulton 8181
Dayton Industrial Sup. Co., 257 Wayne
Dayton Welders Sup. Co., 619 Longworth

DAYTON, O. (CONT'D)

C. H. Gosiger Machy. Co., 108 McDonough
Industrial Steel Serv., 1300 E. Monument
Lewis Motor Mart Co., 301 E. 2nd St.
Weiler Welding Co., 318 E. 2nd St.

HAMILTON
Superior Oxy-Acetylene Mach. Co.

MARTINS FERRY
James C. Dawes Co., 24 No. 5th St.
Martins Ferry Weld. & Sup. Co., No. Zane Hy.

READING
Independent Oxygen Co., Reading Rd.

SANDUSKY
Rinkleff Hdwe. Co., 121 W. Water

SPRINGFIELD
Springfield Welding & Supply Co., 128 N. Spring St.

TOLEDO
The Erie Tool & Supply Co., 616 N. Huron
The Kirkby Mach. & Sup. Co., 20 St. Clair
Menna Welding Co.

THE STELLHORN CO
SMITH ACETYLENE & ELECTRIC WELDING EQUIPMENT
WESTINGHOUSE ELECTRODES
DURO HOLDERS
ACCESSORIES
1505 Washington St ADams 7238

Union Supply Co., 27 Superior St.
Welder's Service Co., 2058 Canton Ave.

WARREN
The Trumbull Mfg. Co.

WEST ALEXANDRIA
VICTOR EQUIPMENT CO.,
Sight Feed Generator Company

YOUNGSTOWN
Cavanaugh Co., 274 W. Federal St.
Fetzer Equipment Co., 25 W. Hylda
Mahoning Valley Rubber Co., 2228 South Ave.
Mahoning Welding Supply, 801 Market
Snyder Bentley Co., 1119 Manning Ave.
Stambaugh-Thompson Co., 114 W. Federal
Welder's Sales & Service Co., 65 Essex St.

OKLAHOMA

ADA
Ada Iron & Metal Co.

MUSKOGEE
Central Welder & Machine Works

OKLAHOMA CITY
Allied Equip. Co., 1639 E. Main St.
Big Three Weld. Equip. Co, 1103 W. Reno
Butler Elec. Motor Service, 921 W. Main

HART INDUSTRIAL SUPPLY CO
Distributors
WESTINGHOUSE
DC AND AC WELDERS
Purox, Prestoweld and Meco Acetylene Equipment
Murex Electrodes
Arcos Stainless Electrodes
Willson Goggles, Helmets and Respirators
A complete Mill Supply and Machine Shop Service
409 West California
Also Pampa, Tex and Borger, Tex

Line Scale Co., 907 S. East 29th
Mideke Supply Co., 100 E. Main St.
O. K. Pipe & Supply Co., 1110 S.E. 29th St.
Sharp Auto Supply Co., 121 N.W. 8th St.
Steel Sales & Supply Co., 2 W. Pott St.
Town-Sco Equipment Co., 311 W. 10th St.

VICTOR EQUIPMENT CO.,
Big Three Welding Equipment Co.,
1103 West Reno St.

SHAWNEE
Shawnee Motor Supply Co.

TULSA
Allied Steel Prod. Corp., 1407 N. Peoria St.
Apex Machine & Mfg. Co., 113 S. Denver
Big Three Welding Equipment Co., 102 S. Cheyenne St.
Brown, Willis & Co., 2240 S. St. Louis
Home & Bldg. Materials Corp., 321 W. 2nd
McKissick Prod. Corp., 2857 Dawson Rd.
Moorlane Co., 409 E. Archer
Oklahoma Oxygen Co., Sand Spring Rd.

TULSA, OKLA. (CONT'D)

Adolph Schillinger & Sons, 501 S. 54th & W Ave.
Tractor Truck Equip. Co., 502 E. Fourth
VICTOR EQUIPMENT CO.,
Big Three Welding Equipment Co.,
2750 Sand Springs Road
Welders Sup. Co., 315 E. Third St.

OREGON

KLAMATH FALLS
Lorenz Co.

PORTLAND
Andrews Equip. Serv., 404 N.W. Broadway
Ballou & Wright, 327 N.W. 10th St.
Clyde Equip. Co., 1631 N.W. Thurman St.
Davis Industrial Prod. Co., 401 N.W. 6th
GLENN-ROBERTS CO.,
Industrial Specialties Co.,
940 S.E. Seventh Ave.
J. E. Hazeltine & Co., 115 S.W. 2nd Ave.
Industrial Air Prod. Co., 3200 N.W. Yeon
Industrial Specialties Co., 940 S.E. 7th
Modern Welding Equipment Co., 4760 N. Lombard
Portland Oxygen Co., 3332 N.W. Yeon St.
Thompson Welding Sup. Co., 1500 N.W. Lovejoy St.
VICTOR EQUIPMENT CO.,
J. E. Hazeltine & Co.,
115 S.W. Second Ave.
Welders Supply Co., 2329 N.E. Union St.
Woodbury & Co., 133 S.W. 2nd St.

SALEM
Valley Machine & Welding Co., 252 State

PENNSYLVANIA

ALLENTOWN
Joe Beckett, 341 Union St.
Everson Electric Co., 1118 Union Blvd.
Goldberg's Altoona Auto Accessories Co., 2210 Beale

BELLEFONTE
Bloomquist Company, R. T.

CHAMBERSBURG
Southern Oxygen Co., Inc.

DOYLESTOWN
Doylestown Agriculture Co., W. Ashland

EASTON
Sears & Bowers, 411 Spring Garden
Stokes Engrg. & Supply Co., 48 S. Green

ERIE
Boyd Welding Co., 160 E. 8th St.
Cohen Auto Parts
Erie Concrete & Steel Supply Co.
Erie Equipment Mfg. Co., 836 E. 10th St.
Erie Welder Serv. & Equip., 1126 Walnut

GETTYSBURG
Southern Oxygen Co., Inc.

HARRISBURG
Appleby Bro. & Whittaker Co., 216 S. 2nd
E. Mather & Co.
Naylor & Goetze, 1918 N. 4th St.

HAZLETON
B. D. Hartman, 138 E. Chestnut

HUMMELS WHARF
David E. Fisher

JOHNSTOWN
Dale Oxygen & Acetylene Service, 611 Messenger
Harvey's Welding Service, 833 Wood

KINGSTON
Stull Bros.
Welders Supply Co.

McKEESPORT
McKeesport Auto Parts Co.

NEW KENSINGTON
H. A. Klingensmith & Sons

NORRISTOWN
Burdett Oxygen Co.

OIL CITY
R. N. Goss Gas Products

PHILADELPHIA
Dorsey C. Anderson, 401 N. Broad St.
Arcway Equipment Co., 3717 Filbert St.
Delta Equip. Co., 148 N. 3rd St.
Edgecomb Steel Co., "D" St. Below Erie
Peter Frasse & Co., Inc., 3921 Wissahickon
GLENN ROBERTS CO.,
Morris, Wheeler & Co., Inc.,
Fox St. & Roberts Ave.
L. Norris Hall, Inc., 3520 Indian Queen Lane
Harris Sales Co., 1426 S. 56th St.
Geo. M. Hessdoerfer, 117 N. 3rd St.
H. H. Kress, 1718 Sansom St.
R. S. McCracken & Son, 636 N. 13th St.
Morris Wheeler & Co., Fox St. & Roberts
J. N. Moyer, 465 N. 5th St.

Where . . . TO BUY IT

PHILADELPHIA, PENN. (CONT'D)

Northeast Metals Co., Torresdale & Paul
O'Brien Machinery Co., 113 N. 3rd St.
Paschall Oxygen Co., 73rd & Woodland
Penn Machinery Co., 10th & Rising Sun
Pittsburgh Thermolene Co., 1600 Arch St.
Horace T. Potts Co., Erie Ave. & "D" St.
Jos. T. Ryerson & Son, Inc., 52nd & Grays
F. A. Saylor Co., 1428 Race St.
Sees & Faber Co., Inc.

VICTOR EQUIPMENT CO.,
Paschall Oxygen Company,
73rd & Woodland Ave.

Welding Service Co., 258 So. Van Pelt
Otto Wilhelmy & Son, Commercial Trust Bldg.

PITTSBURGH
Alloy Specialties Co., 2441 Waverly
Arcway Equipment Co., 313 6th Ave.
J. B. Booth & Co., 214 E. Gen. Robinson
Crawford Weld. Rod Co., Diamond Bank Bldg.
Dravo Corp. Machinery Div., 302 Penn
Frick-Reid Sup. Corp., 305 Ross
Goss Gas Prod. Co., 5209 Baum Blvd.
Niedringhaus Co., 5777 Baum Blvd.
Wm. M. Orr Co., 1228 Brighton Rd.
Pennsylvania Weldit Co., 900 W. Diamond
Phillips Mine and Mill Sup. Co., 2227 Jane
Pittsburgh Gage & Sup. Co., 3000 Liberty
Pittsburgh Thermoline Co., 14 S. 19th St.
Safety First Supply Co., 530 Fernando St.
Scully Steel Prod. Co., 1281 Reedsdale, N.S.
Shop Supply Co., 325 Center Ave.
Somers Fitler & Todd Co., 313 Water St.

VICTOR EQUIPMENT CO.,
Wm. M. Orr Company,
1228 Brighton Road

Weldcraft Equipment Co., 2623 Liberty
Welders Service Co., 229 Blvd. Des Allies
Williams & Co., 901 Pennsylvania Ave.
Ziegler Machinery, Inc., 528 1st Ave.

READING
Bard Hardware Co., 800 Penn
F. Jones, 245 Buttonwood St.
L. J. Land Co., 12th & Spring Sts.

SCRANTON
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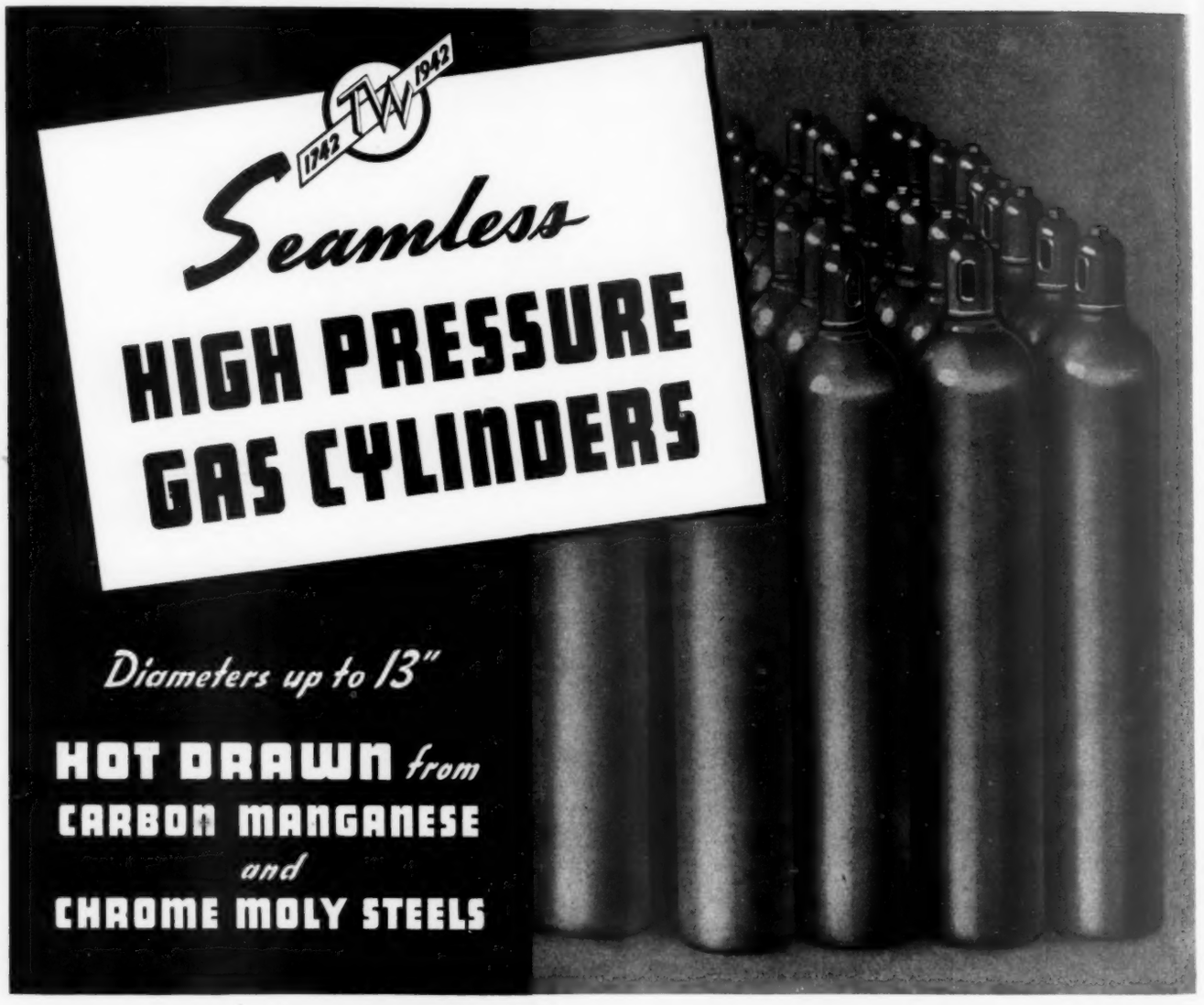

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1742—OUR TWO HUNDREDTH YEAR—1942

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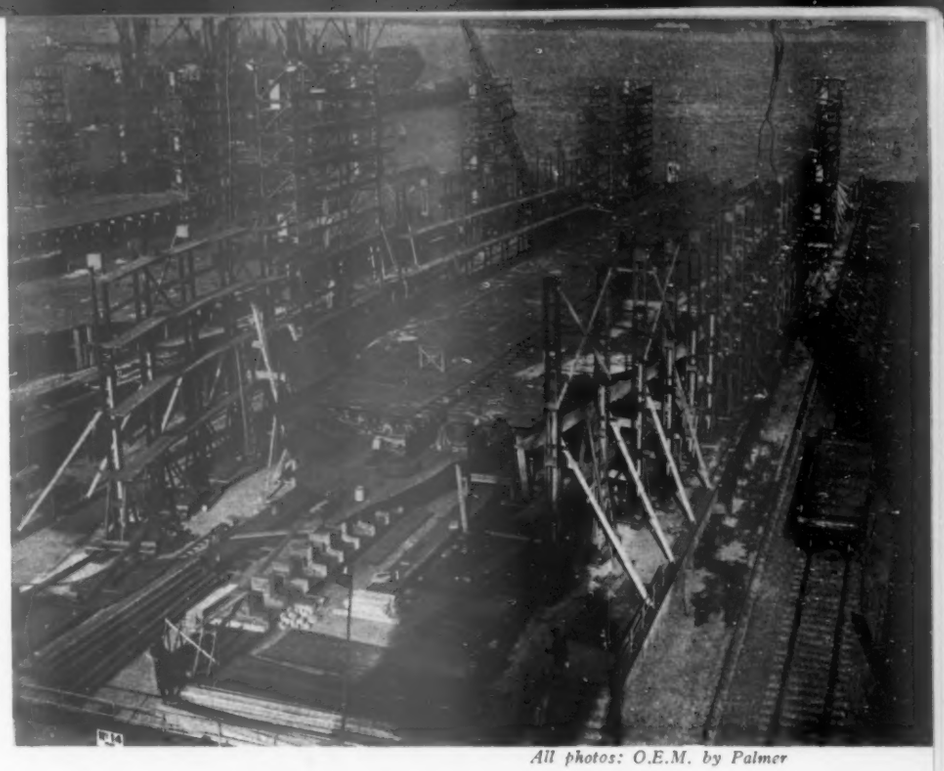

The bottom and side shell plating and the inner tank sections are being assembled.

All photos: O.E.M. by Palmer

Building Liberty Ships

Prefabrication and welding is speeding the construction of ships to win the war. Welding is saving time, weight and steel while making possible a stronger ship.

UGLY DUCKLING—as the Liberty ships have been called—is a misnomer for a merchant vessel built at top speed in a race to put more freighters to sea than the enemy can sink.

In World War I they were ugly indeed, and very few were sunk, because hastily-constructed shipyards got into production too late. Most were launched after the Armistice, the majority in 1920.

But in this war, plant conversion and assembly line methods make a sleek, one-funnel job, 441 ft. long and 57 ft. wide at the hips, and they make it quickly. Ugly Ducklings pour out of inland and coastal plants in prefabricated sub-assemblies at the rate of one a day. Before the year is out, two a day will be splashing from the ways.

Prefabricated

To make an Ugly Duckling, dump 3200 tons of steel plates, girders, bars, angles and channels at one end of a prefabricating plant. Haul the stuff by overhead cranes down a production line to be cut, bored, punched, sized, shaped and welded. Then load each resulting sub-assembly on a freight train at the other end of the plant and send it down to the sea, each to be welded or riveted into place.

Quicker Production

But first get a factory that can do this. Hog Island and its kindred shipyards had to be built before an hour's work began on ships in the last war. The shortest span between breaking ground for a shipyard and launching a vessel was 16 months. But now, by converting inland and coastal factories—such as the one to be described here—only 11 months elapse between awarding of the contract and christening a Duckling.

At an anonymous plant because it is near the coast and a likely target for bombers or saboteurs, the name and site of this factory may not be mentioned; but, before it was abandoned to a maintenance crew 10 years ago, it turned out freight cars. Leased in March of 1941, the plant was converted quickly and began work before June. With a nearby shipyard to assemble its bits and pieces, it turned out its first ship before Christmas—a record. Now it is making one a week, and before long will hatch one every 3½ days.

All in all, this plant and its shipyard surpass 1919's Hog Island. They have more speed and less noise. Welders have replaced most of the riveters of 22 years ago, who hammered out as much racket as our guns then banging at the Hindenburg line. In 1941 and 1942, sound effects are muted.

Assembly Line Methods

When ship builders took over this plant last April, they cleaned house, evicting thousands of sparrows from the rafters of the 15-acre roof, and moving machinery around to function like a stream-lined auto plant. There was room to do it. The draughty, gloomy barn is 270 ft. wide, and

Prefabricated parts are inspected before being shipped to the yards for assembly.

1,620 ft. long—the largest cargo ship shop in America.

Reclaimed Machinery

By putting in new dies and cutting edges for tools already in the plant, almost all the machinery that had made freight cars was converted to the making of freighters. A 30 per cent increase in installations was needed, but most of them were second hand. One of the largest additions to the plant was designed in Germany. It is a plate roller so big it looks like four coast defense guns employed as a wringer.

Built in Chicago in 1919-1920, at a cost of $180,000 it was used by United States Steel until 1937, then went to a used-machinery dealer who found no buyer until the freight car shop was converted. Then it sold for $45,000—a bargain. It would take a year to replace the great machine.

420 Plates a Week

This roller, busy night and day, shapes 420 plates a week for the sides of ships. It is temperamental. It needs care and nursing. Without proper direction, the plates it bends would fit a ship as loosely as the petals of an artichoke. It is a one-man critter, and its master is Albert Alms, who, as a young machinist, helped build this wonderful wringer, learned to operate it, then made it his career. He has been with it ever since. When it was called into service last March, Alms directed its installation, taught a new crew to run it, and stood by to direct their work.

The largest installations for the converted plant were the furnaces, where heavier work, such as the ribs of the ship boss, the bilge, stem, stern, and thick keel plates, are softened up for shaping in 3,000 F. Hauled out on a steel floor perforated with squares like a waffle iron, the red hot steel is shaped by crews operating hydraulic presses called pushers and rams. These bend and shape the metal against steel molds or pattern of metal pegs driven into the floor.

Marking plates for welding and fabrication.

400 Plates per Hull

Each of a ship's 400 side plates has a shape and size of its own. Designers work months making these dummies show the exact shapes and dimensions. Symbols indicate rivet holes, cuts, bevels, sections to be reinforced, and the plate's definite position on the ship. When these marks are transferred to the metal in colored hieroglyphics by workmen flourishing long-handled paint brushes, each steel sheet looks like a gigantic Chinese laundry slip.

So painted, the plates, dangling from overhead cranes, sail down the production line of the once gloomy shop. Safety crews escort them to the ringing of warning bells, so that no workman gets clipped on the head. At all times, at least 50 tons of steel —parts of 22 ships are swinging through the factory.

Sub-assemblies

Each plate stops at the machines that will process it. If it requires rivets, it goes through presses that punch holes as though through cheese. If it is too large, it is cut to pattern by machine shears, planers and hand torches. Once processed, the plate swings out the other end of the plant through hanger-like doors for welding into sub-assemblies—22-ton double-bottom sections, for ex-

Flatcars loaded for a six mile trip to the shipyard.

Welding Stainless?

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ample, 22 ft. by 29 ft., and 4 ft. thick. Two such sections span the breadth of a standardized boat.

To Shipyard By Rail

Flatcars tote the sub-assemblies, 30 cars at a time—to the shipyard, where they are hoisted up, over and fastened in place. Most are pasted together by welders, some pinned together by riveters. Respective sub-assemblies are interchangeable in this day of mass production. Parts of one ship fit another like parts of automobiles.

It takes 2,550 tons of girders and plates, 55,000 rivets and 194,000 linear feet of welding to put an Ugly Duckling into floating condition. Once off the ways, it then gets its engine and deck fittings.

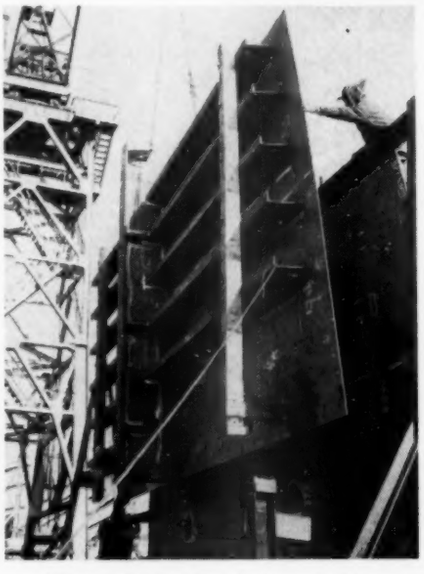
Welding—Less Rivets

Welding, which saves time, steel, and weight, makes a Duckling from 10 to 15 per cent lighter and much stronger, and gives it sweeter lines than the really ugly Ugly Duckling of 1919, which had 900,000 rivet bumps. Consider the saving of 845,000 rivets, and 1,790,000 rivet holes for each boat.

Personnel Training

Although it requires more skill to put a ship together today than it did 22 years ago, more than 85 per cent of the 2000 employees at the plant alone started from scratch, when work began last spring. These inlanders—98 per cent native Americans from plantations, steel mills and coal mines—had never seen an ocean-going ship, let alone a shipyard. Classes have taught trades to most of the 8000 employees at work now. In less than a year, industrial education has made them skilled erectors, fitters, reamers, drillers, welders, riveters, burners, and caulkers. Except for those experienced foremen and leadmen assigned from other shipyards, employees are enlisted at the gate.

Two Liberty Ships lying at anchor awaiting final fitting and rigging.



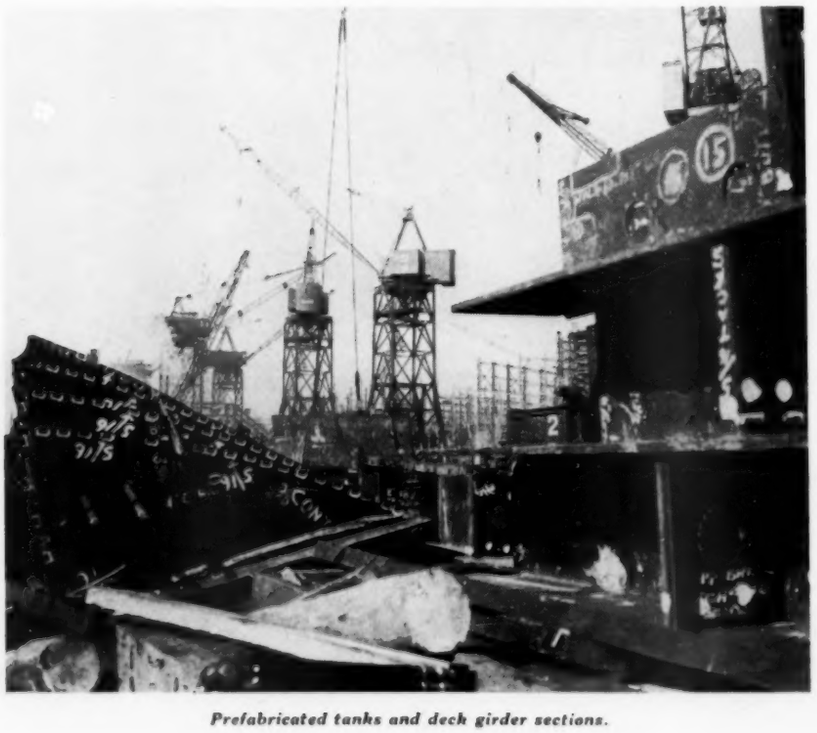
All assembled and ready to go in place.

Inspection

There is another type of men, however, at both plant and shipyard—Government officials who never seem to sleep or eat. By day and by night they putter among stock piles, climb about unfinished ships, or contemplate welding jobs or rivetings. They are Maritime Commission inspectors looking for errors in workmanship and placing their years of practical experience at the disposal of the contractor's organization, towards speeding production.

A mistake in the mold loft, where patterns are made; an incorrect marking on a girder, or a hole burned in the wrong plate might cause a disaster, or, more probably, entail expensive delays. But there are few errors and few delays—this converted plant works as though built for no other job.

THE END



Prefabricated tanks and deck girder sections.

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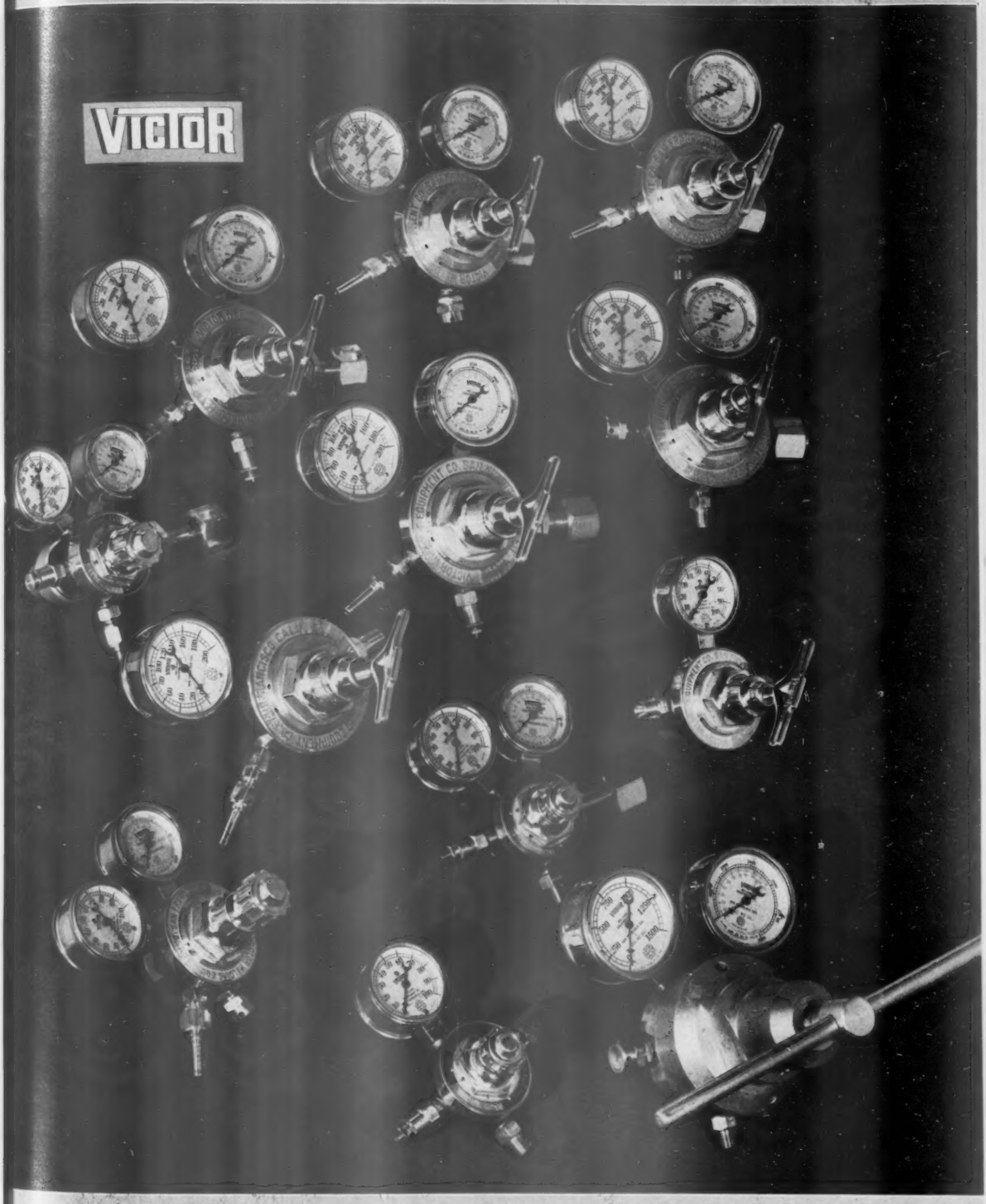

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Brief Sketches of Welding Jobs

Job Shop Bench

By R. C. BERCAW

A combination welding and cutting bench is a mighty useful piece of equipment for the industrial maintenance department or job welding shop. Here is a design, however, that can be built in size and shape to suit individual ideas or requirements.

The top frame is of ¼ in. x 2½ in. x 2½ in. steel angles with the horizontal leg turned in to support the cross members, which are ½ in. x 2¼ in. steel bars cut to length so that they slide down into ½ in. slots on the inside of the vertical leg of the angle iron top frame. These cross members are thus removable so that they may be spaced close together or far apart to support parts that are to be cut by means of the cutting torch or arc. The floor under the bench should be covered with refractory brick for protection from sparks and molten metal; steel plates, on edge, around the brick offer additional protection in addition to keeping the bricks in place.

Photo Courtesy Hobart Bros. Co.

A cutting and welding bench which may be easily constructed to fit one's individual needs.

For welding, a removable steel plate of the desired size may be used to form the bench top. Note the convenient vise mounted on one corner of the bench, and the electrode receptacles made of scrap pipe welded to bases of steel plate. Attached to the bench nearby is a steel rod, insulated with rubber hose which forms a convenient receptacle for the electrode holder when not in use.

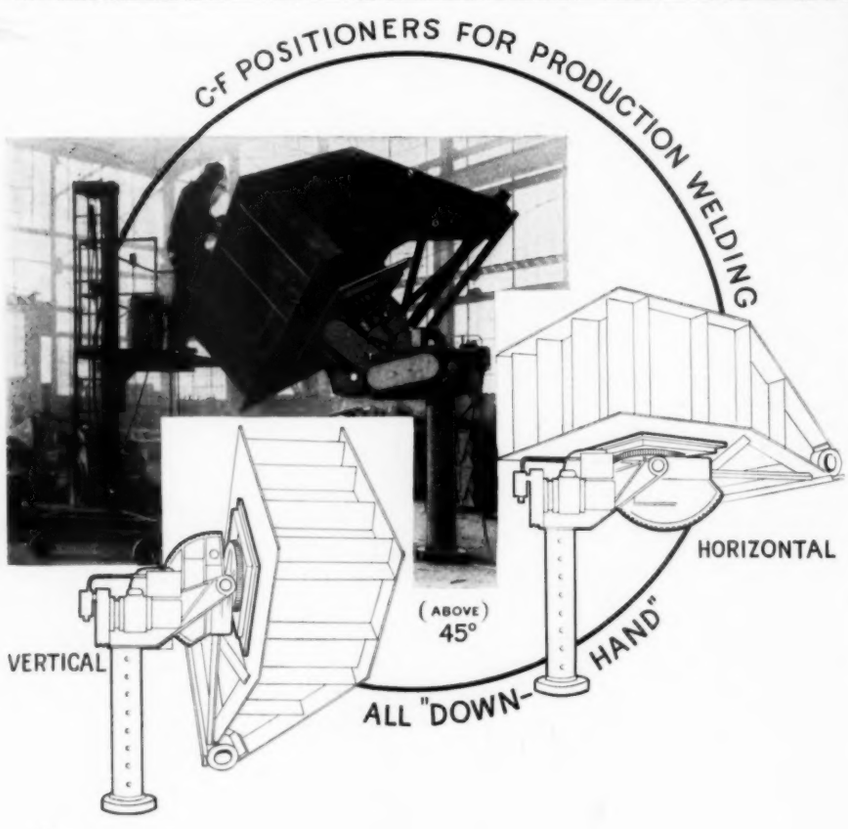
The use of welding and cutting and a little imagination will make it possible for the modern job shop weldor to build many devices which will make his work much easier. Aside from the cutting and welding bench illustrated, it is possible to make many jigs, fixtures and other items which will not only position the work but hold it in line during the welding operation. With a shortage of material it will be impossible to buy every item you need so now is a good time to consider the possibilities of building your shop equipment.

» «

Cutting Machine

By FRED H. ZOELLNER

In the operation of welding schools, the amount of cutting frequently does not justify the buying of an expensive cutting machine. To overcome this obstacle, the Ohio Mechanics Institute has designed a cutting machine which would very nicely give good clean straight edges. This machine is a simple inexpensive, easy to make fixture for holding and guiding the cutting torch and is used to cut 9/32 in. x 2 ft. x 2 ft. croppings, which are purchased from a local



● Where there are many parts to fabricate into one unit and many welds to make in doing it, C-F Positioners with push button operation for tilting and turning save welder's time, save crane time, and save production time. Positioned welds are better welds because they may all be made "down-hand".

●

Write for Bulletin WP 20 which describes these production machines for fast economical welding.

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Designed for single or multi-circuit manual operation, Unionmelt or automatic-head welding, these flexible units are ideal for production welding where demands vary. Their several basic transformer units may quickly be paralleled to deliver high amperage for heavy work, or as quickly connected to separate leads for one or more manual operators. Time-saving remote control and load-cutting power factor correction available. Sizes range from 450 to 2500 amperes maximum output. (Model 65, 100-1000 amperes, illustrated at left).

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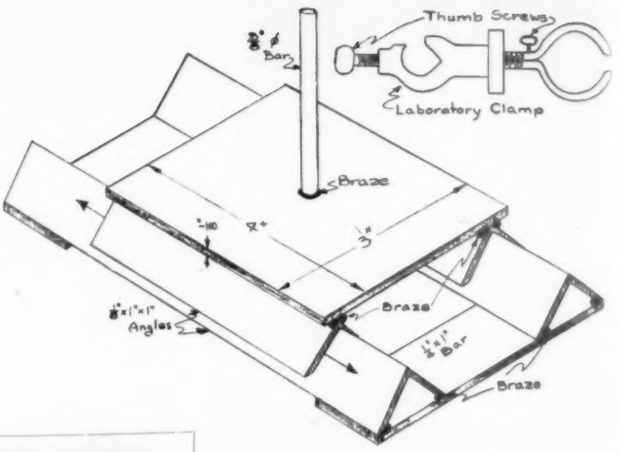
steel mill, to make strips for oxy-acetylene and electric arc welding classes.

The cutting operation is carried on merely by clamping the cutting torch in a laboratory clamp which has been clamped in the proper position on the bar standard of a simple slide arrangement. With this slide to guide the cutting torch, it is started and slowly moved along, giving a clean straight edge cut.

There isn't much to be said in the way of construction, as the measurements will vary for different jobs and conditions. The only caution to observe is this: the plate should be longer in the direction of travel than it is wide. This avoids any tendency of the guides to stick. Also the standard should be mounted in the center of the plate crosswise and near one end lengthwise in order to balance the weight of the torch it is clamped in the holder. The plate carrying the torch is quite obviously moved by pushing with the hand.



By welding a few pieces of scrap metal together, as illustrated, to make a guide, it is possible to build a simple cutting machine that will cut straight edges. The cutting torch is held in a true position by means of the laboratory clamp.

« »

Longer Life for Dipper Teeth

By H. W. TYMICK

On a recent excavating job when resurfacing of worn teeth was necessary, it was also decided that longer teeth on the dipper would do the work better. By using modern "dipper dentistry," here's how the teeth were repaired, and shovel performance on this particular contract stepped-up at the same time.

Five-inch extensions of 1040 steel were added to the original length of the teeth. The extensions were beveled and butt welded. Stringer passes were used and each pass was cleaned and peened. To assure a strong weld between the original teeth and extensions, which were of different analyses, a stainless steel electrode was used.

Photo Harnischfeger Corp.

Reclaiming dipper teeth is an important operation in the conservation of materials.

Next, to protect the new teeth against untimely wear, their points were overlaid with a hard facing material applied in stringer passes over 2-in. at the bottom and 1-in. on top. This electrode is self-hardening and provides toughness and resistance to abrasion especially under cold working. Its "as welded" hardness is approximately 50 Rockwell C and by light peening can be raised to about 60 Rockwell C.

In cases like this as well as for general maintenance of dipper teeth, welding with proper electrodes is proved by

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the usual superior results obtained and by ultimate lower cost. This operation required 9.4 hrs. actual welding time.

» «

Keyway Cutter Repaired

With metal working tools at a premium these days it is vitally important that broken pieces be repaired if it is at all possible to do so. A case in point at the Westinghouse East Pittsburgh works is that of a $100 keyway cutter which was repaired at a total welding cost of $25.

Cracked and Scrapped Cutters can now be reclaimed with savings in money and time.

A .005 in. crack extended from keyway to base of the cutting tools. To repair, grooves were extended on both sides of the cutter and ground ⅛ inch. The radius of the groove at the bottom was 10 degrees. The cutter was preheated to 800 F and welded with an 18-8 stainless steel electrode, ⅛ in. in diameter. The piece was reheated to 800 F and allowed to cool slowly in an open end furnace. Cutter was then hardened by heating to 2300 F, followed by cooling in an air blast.

» «

Size No Obstacle

Whether it's a pee wee or a mountain size repair job, modern electric arc welding takes them all in its stride. Recently in a Buffalo plant, a 13,000 lb. cast steel crosshead from a blast furnace blower engine, measuring 14 ft. x 5 ft., was cracked at two points, with one end completely broken off. To await manufacture and shipment of a replacement part would have meant a long shut-down of the unit with terrific dollar loss.

Yet, at first, repairs by welding appeared impractical due to the large size

Harnischfeger Corp. Photo

Welding shortens shut-down time of blast furnace blower engine.

(continued on page 97)

(ADVERTISEMENT)

Stopping One Hundred Tons with Amsco #459

Or perhaps we should say, millions of tons, for the heads of the adjustable bolts in the car retarder units (shown in A237) work in sockets, actuating retarder beams which stop loaded freight cars many times a day, the year around.

These retarders are used in a "hump" yard where cars are classified according to destination. They are pushed over the "hump" by a locomotive from which they roll by gravity toward a pneumatic or electric switch for routing to various "make-up" tracks. The retarder acts as a brake, slowing up or stopping the car or cars.

The bolts, adjustable to compensate for wear of the friction shoes on the retarder beams, take the brunt of the impact. The socket in which the bolt head is seated, as shown in A238, is also subjected to severe service. To enable them to resist wear, a mid-west railroad built up a set of bolts with high carbon welding rod and ran a test by hard-facing them with Amsco No. 459 and a competitive rod. A bolt head, as worn and as restored and worn sockets are shown in A239.

Both hard-facing materials gave 4 to 5 times more service than that obtained from ordinary heat treated bolt heads, but Amsco No. 459 cost approximately half as much as the other rod.* The time involved was the same, so it's No. 459 from now on, with this user, who also applies this impact and abrasion resistant rod to worn sockets or seats, as well as the bolts.

In every industry where ferrous equipment parts are exposed to impact and abrasion, replacement can be minimized and materials vital to defense can be conserved by "slowing up" wear with a protective application of Amsco No. 459.

Send for Bulletin 941-W — shows how to save for yourself while helping to serve our nation with Amsco salvage, repair and hard-facing materials.

*Name of railroad and competitive welding rod on request.

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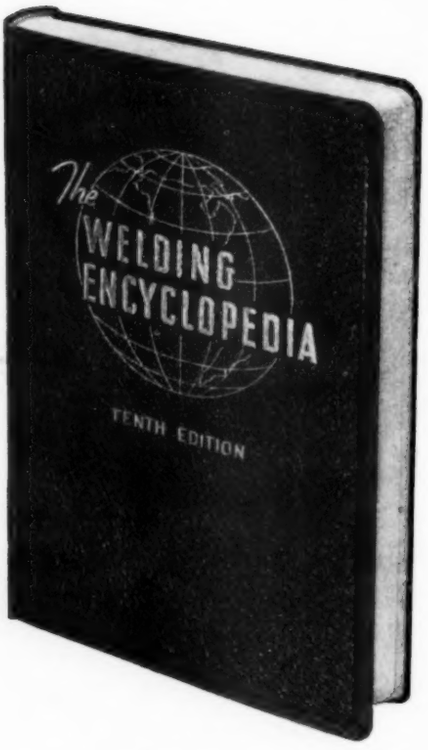

Every Welder Should Have A Copy of THE WELDING ENCYCLOPEDIA

TENTH EDITION

The Only Book of Its Kind

Covers all phases of welding and cutting	Alphabetically arranged for instant reference	Contains both up-to-date and fundamental information
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The present edition of The Welding Encyclopedia has been built by constant addition and revision since the first was published in 1921. Information is arranged in dictionary form with complete cross references, making it possible for the welder to use it handily as a source of help. Things are easy to find and subjects are explained in detail. Where necessary numerous illustrations help apply practical knowledge and workmanship.

For more than twenty years there have been Welding Encyclopedias. So fast has been the growth of the industry that the Encyclopedia has been changed ten times. The present edition contains all the *basic* information in earlier editions *plus* details of the latest practices. It is truly a working manual for the up-to-date welder, engineer, superintendent, foreman, supervisor, student or instructor. No matter what kind of welding you do, you need this book!

Price $5.00

A few of the up-to-the-minute chapters added to the Tenth Edition.

Oxy-Acetylene welding of light aircraft.

Data on costs and cost records for users of arc-welding.

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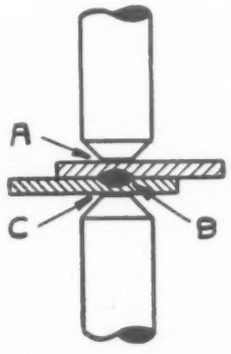
RESISTANCE WELD AND SEQUENCE TIMERS

18 NEMA STANDARD TYPES



RESISTANCE welding is accomplished when two or more pieces of metal are clamped between copper electrodes and an electric current is passed through them. Heat generated at point B reduces the metal to a plastic state, then clamping pressure induces fusion. Pressure is required to make the resistance at points A and C low compared with B; a condition must prevail, when power is applied, if burning of the work surfaces is to be avoided. Thus both pressure and power must be controlled in proper sequence during the resistance welding process.

Weld and Sequence timers are used to automatically control machine operation. *A semi- automatic weld timer* is a device for controlling only the duration of current flow through the work in making a resistance weld. Electrode motion must be accomplished by some other means, such as a foot pedal or motor driven cam.

An *automatic weld timer*, used with an air operated machine, controls not only the duration of current flow through the work piece, but also the order and duration of the several pressure events occurring during the complete resistance welding cycle. The group of current and pressure events which require control are:

Squeeze Time—The time from application of pressure to the electrode actuating means until application of welding current.

Weld Time—The time that the welding current is applied to the work piece in making a single weld.

Hold Time—The time during which pressure is maintained at the electrodes after the current is off.

Off Time—The time (in repeat welding) that the electrodes are separated from the work piece.

Pulsation Weld Timers are available in both the semi-automatic and automatic forms. Pressure events are the same as those defined above but the welding current is interrupted repeatedly while the pressure is held on the work piece. The usual Weld Time is then replaced by the three periods defined below.

Heat Time—The time that welding current flows between interrupted periods when welding by the pulsation method.

Cool Time—The time that the welding current is interrupted when welding by the pulsation method.

Weld Interval—The total Heat and Cool times (or the total welding period) when welding by the pulsation method.

A *Sequence* timer is a device for automatically controlling only the order and duration of the several pressure events occurring during the resistance welding cycle. Means for properly interlocking the separate weld timer with the pressure events is included.

The tabulation below contains the 18 NEMA Standard Weld and Sequence timers designed to control semi-automatic and automatic machines engaged in various kinds of resistance welding operations.

Classification		Weld Timers		Pulsation Weld Timers		Sequence Timers		Pulsation Sequence Timers	
		NEMA No.	Timing Period	NEMA No.	Timing Period	NEMA No.	Timing Period	NEMA No.	Timing Period
Semi-Automatic Non-Repeat	Non-repeat without non-beat feature; for use on manual, air, or motor operated welders having a maintained type initiating switch.	1A	1—Weld	1B	1—Weld Interval 2—Heat 3—Cool				
Automatic Non-Repeat	Non-repeat, non-beat; for use on air operated welding machines controlled from electrically operated air valves.	2A	1—Weld 2—Hold	4A	1—Weld Interval 2—Heat 3—Cool 4—Hold	6A	1—Hold	8A	1—Weld Interval 2—Cool 3—Hold
		2B	1—Squeeze 2—Weld 3—Hold	4B	1—Squeeze 2—Weld Interval 3—Heat 4—Cool 5—Hold	6B	1—Squeeze 2—Hold	8B	1—Squeeze 2—Weld Interval 3—Cool 4—Hold
Automatic Repeat	Repeat, non-beat; for use on air operated welding machines controlled from electrically operated air valves.	3A	1—Weld 2—Hold 3—Off	5A	1—Weld Interval 2—Heat 3—Cool 4—Hold 5—Off	7A	1—Hold 2—Off	9A	1—Weld Interval 2—Cool 3—Hold 4—Off
		3B	1—Squeeze 2—Weld 3—Hold 4—Off	5B	1—Squeeze 2—Weld Interval 3—Heat 4—Cool 5—Hold 6—Off	7B	1—Squeeze 2—Hold 3—Off	9B	1—Squeeze 2—Weld Interval 3—Cool 4—Hold 5—Off

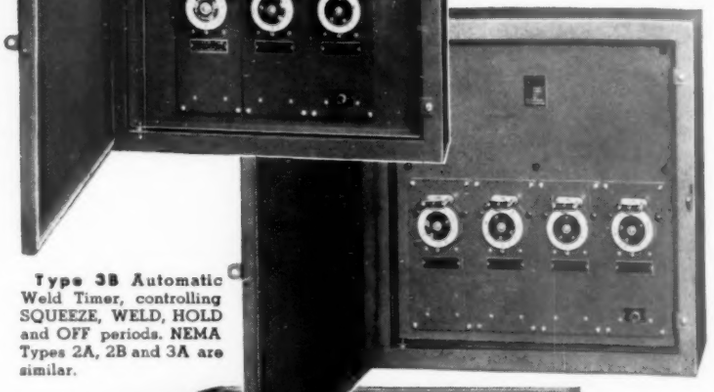
18 NEMA STANDARD TYPES of *Safront* WELDER CONTROL WELD and SEQUENCE TIMERS

SQUARE D COMPANY
INDUSTRIAL CONTROLLER DIVISION
MILWAUKEE, WISCONSIN, U.S.A.

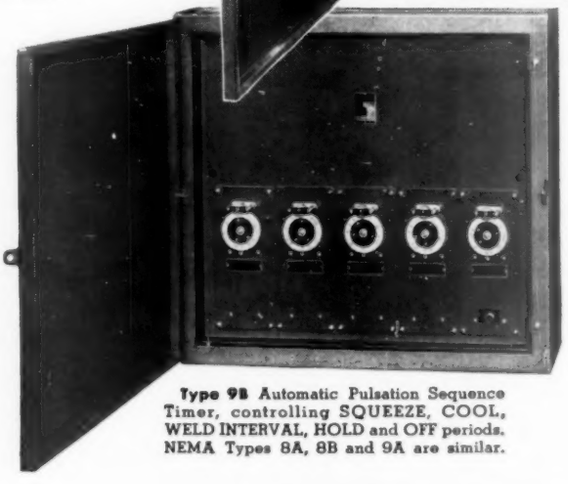
In the *Safront* family, resemblance is not limited to appearance. Each member utilizes Square D's simple pneumatic timer—for accurate and reliable control of all steps in the resistance welding cycle. Each also includes high-speed relays, mounted on a protective panel which can be swung forward for immediate inspection or maintenance. Each has a separable connector which permits removal of the panel without disturbing outside connections.

These 18 NEMA standard types—available from the five basic classifications illustrated—with either High-Speed or Syncro-Break contactors, meet practically every normal resistance welder control requirement. Unusual application conditions can be met by special construction from unit parts.

Type 7B Automatic Sequence Timer, controlling SQUEEZE, HOLD and OFF periods. NEMA Types 6A, 6B and 7A are similar.

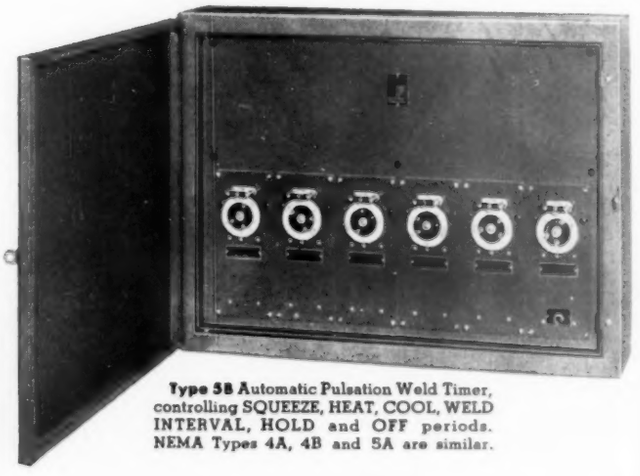


Type 3B Automatic Weld Timer, controlling SQUEEZE, WELD, HOLD and OFF periods. NEMA Types 2A, 2B and 3A are similar.



Type 9B Automatic Pulsation Sequence Timer, controlling SQUEEZE, COOL, WELD INTERVAL, HOLD and OFF periods. NEMA Types 8A, 8B and 9A are similar.

Type 1A Semi-Automatic Timer, controlling only the WELD period. NEMA Type 1B is for pulsation welding.



Type 5B Automatic Pulsation Weld Timer, controlling SQUEEZE, HEAT, COOL, WELD INTERVAL, HOLD and OFF periods. NEMA Types 4A, 4B and 5A are similar.

WRITE FOR CLASS 8991 *Safront* BULLETIN

SQUARE D COMPANY
INDUSTRIAL CONTROLLER DIVISION
4041 N. RICHARDS ST., MILWAUKEE, WIS.

BRIEF SKETCHES

(continued from page 93)

and weight of the broken unit. However, that impression was quickly corrected when the Hebeler Welding Company, local welding contractors, took over the job. After careful preparation and lining up, and about 50 hrs. of actual welding time, Hebeler weldors had the broken end section firmly back in its place. In another 50 hrs. or so, the cracked hub was repaired with a seam that was just as strong as the parent metal. Since the unit has been back in service, there has been no indication of its ever having been damaged except for the welding seams which serve as strong reminders of the time and dollars saved by this modern metal joining method.

» «

Steam Trap Anchored

By M. T. PATE

The trap on a construction job steam line caused considerable trouble by working loose or breaking of the small connection on which it was carried below the main. To afford better support, the welder tied a drop leg, of the same diameter as the steam main, at the point where the trap had been connected, forming an L-shaped collection sump for condensation and at the same time supporting the trap on a nipple welded into the top of the horizontal leg of the drop section.

This support serves a dual purpose—it supports the steam trap and prevents vibration.

Further to support the trap and protect against vibration of the main, the body of the trap was welded with a narrow filler web directly to the vertical section of the drop leg, forming a unit which was secure against breakage and which, protected by the main and drop leg, gave no further trouble.

» «

Welded Trailer

By HARVEY L. WANAMAKER

An ingenious tilting trailer for moving farm implements can be constructed by any job welding shop for less than $100 including tires and wheels. The trailer

Titan Provides the Correct Alloy

FOR EVERY OXY-ACETYLENE BRONZE-WELDING PURPOSE

TITAN Welding Alloys are all scientifically designed, alloyed and fabricated to produce the best possible results for the purposes recommended. TITAN Alloys are exceptionally low-melting. Absolute uniformity is assured by rigid laboratory control. *Double deoxidation increases the ductility of the weld, reduces fuming to a minimum and assures a sound, dense deposit.*

Titan Alloys are furnished in three distinct groups

- MUNTZ TYPE: General Purpose Rods, for High-strength Ductile Welds.
  PENN BRONZE, doubly-deoxidized, low-fuming; flows at 1628°F. TITAN BRAZING BRONZE, flows at 1625°F.
- TIN BRONZES: Hard, Corrosion-resisting; very good on Cast Iron.
  TITAN BRONZE, doubly-deoxidized, low-fuming; flows at 1617°F.
  TITAN NAVAL BRONZE, flows at 1615°F.
  TITAN WEARWELL BRONZE, flows at 1593°F. Special purpose rod possessing great hardness; for building up worn surfaces and for bearing service, etc.
- MANGANESE BRONZES: (General Purpose) Specifically recommended for Cast Iron.
  TITAN MANGANESE BRONZE, doubly deoxidized, low-fuming; flows at 1617°F.
  TITAN NAVAL MANGANESE BRONZE, flows at 1620°F.

Only the purest of raw materials are used in manufacture of TITAN Welding Alloys, Electrolytic copper 99.96 plus in purity and electrolytic zinc 99.99 plus are used, in order to assure elimination of elements, which, if introduced into alloy would prove detrimental to quality and uniformity.

Descriptive circulars sent upon request

TITAN METAL MANUFACTURING CO.,
BELLEFONTE, PA.

TITAN BRONZE WELDING ALLOYS

is constructed entirely by arc welding old car frames, angle iron, used pipe and scrap iron together. With no springs to break or bounce, the trailer will trail at speeds up to 40 mph.

Stationary and tilting frame models have been made from old car frames cut in half. The bed was made of 2 in. x 12 in. planking eight ft. long, which was bolted to the tilting frame. Cable winch on the front of the trailer was built from old transmission gears. This winch is to pull implements that are not self-powered onto the trailer. The trailer hitch was made from a model T Ford universal joint bell housing. The axle was constructed from a 2 in. x 2 in. square mild steel bar by welding heavy tractor spindles to each end. Tilting, up or down, is accomplished by gravity.

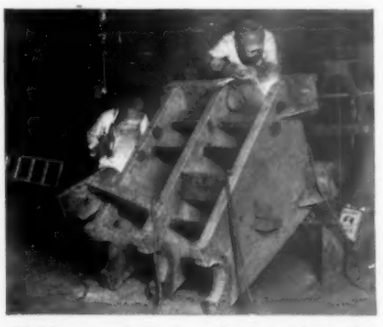
An ingenious trailer for use around the farm resulted from ingenuity on the part of a weldor and welding.

Photo, Hobart Brothers Co.

» «

Tube Mill Stand

Tube mill stands must be sturdy and solid. One way to obtain equipment that possesses extra strength and rigidity is to use all-welded construction. This is the practice of a Milwaukee plant making such equipment.



Welding and 3 in. plates makes this a sturdy structure.

In this plant tube mill stands are fabricated from 3 in. low carbon steel plates. The various plates are joined using a general purpose arc welding electrode which produces a highly ductile deposit. All welding seams were a combination of "Bevel" and "J" grooves to assure full penetration of weld metal. About 400 lbs. of electrodes were required, making the total weight of the completed stand approximately 4¼ tons.

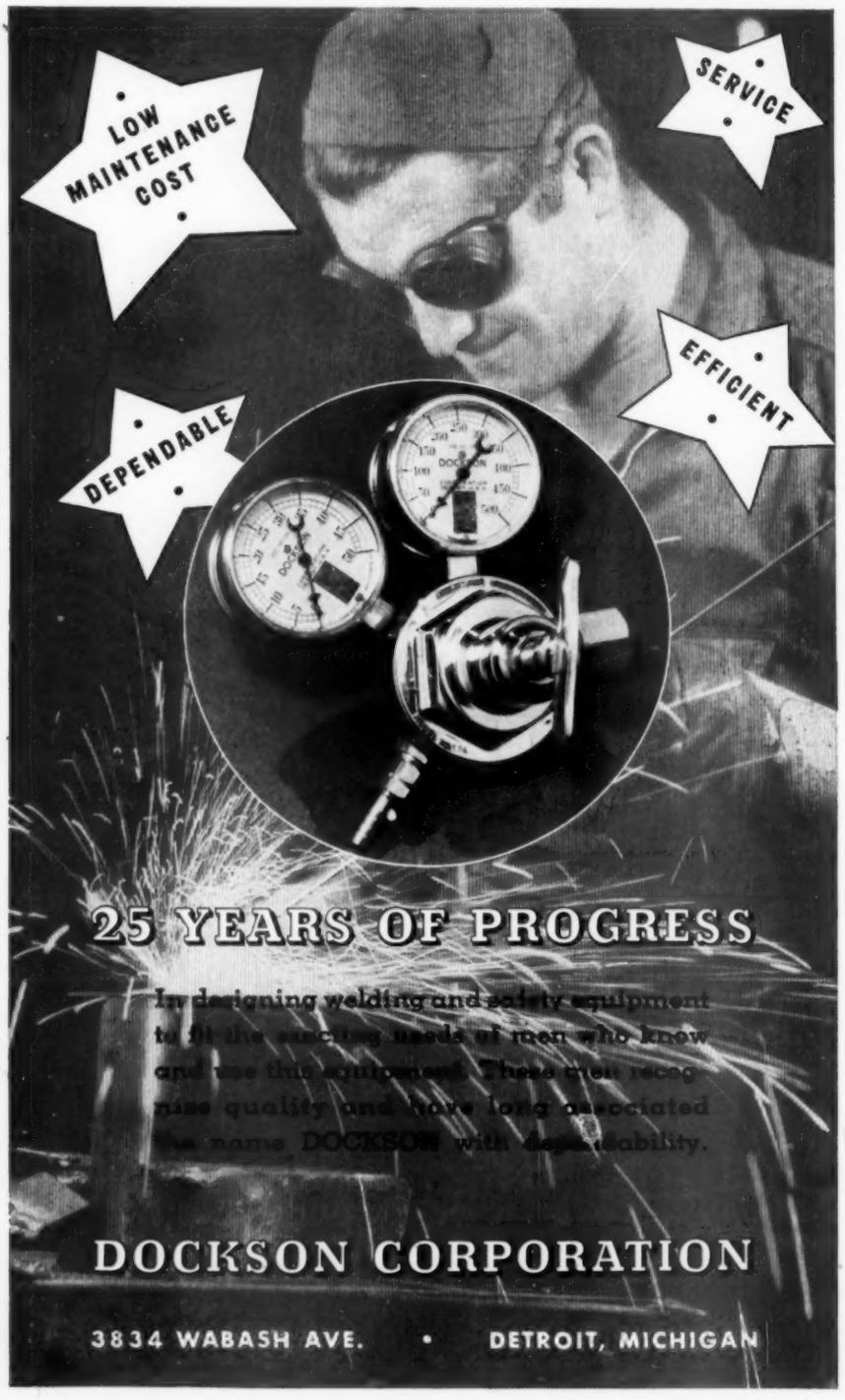
» «

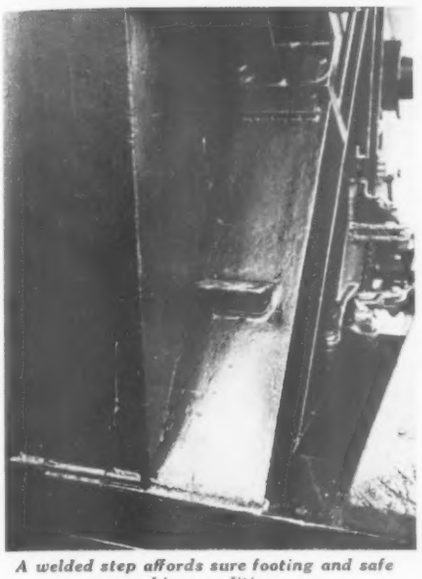
Welded Step Aids Lubrication

By C. C. LYNDE

The use of makeshift supports by the oiler while filling the lubricators on a heavy drawworks is not only hazardous but wasteful. These two disagreeable features were eliminated on one job, by welding a small step to the outer surface of a heavy steel I-beam forming a part of the machine frame.

This step was formed from a piece of heavy plate bent to give a level surface to one part when positioned on the frame. It was then tack welded in place. The metal used was thick enough to provide the desired strength without additional bracing. It was likewise suf-





A welded step affords sure footing and safe working conditions.

ficiently heavy to resist deformation during the rough handling incident to shifting of the drawworks from one job to the next. To afford a better footing, the step was roughened on the top by welding. This step afforded sufficient additional height to make checking of the oil in the lubricators easy, thus avoiding flooding and waste which formerly occurred when the job was attempted working from the floor level.

» «

Impromptu Scrap Iron Hoist

By RAY CLEGG

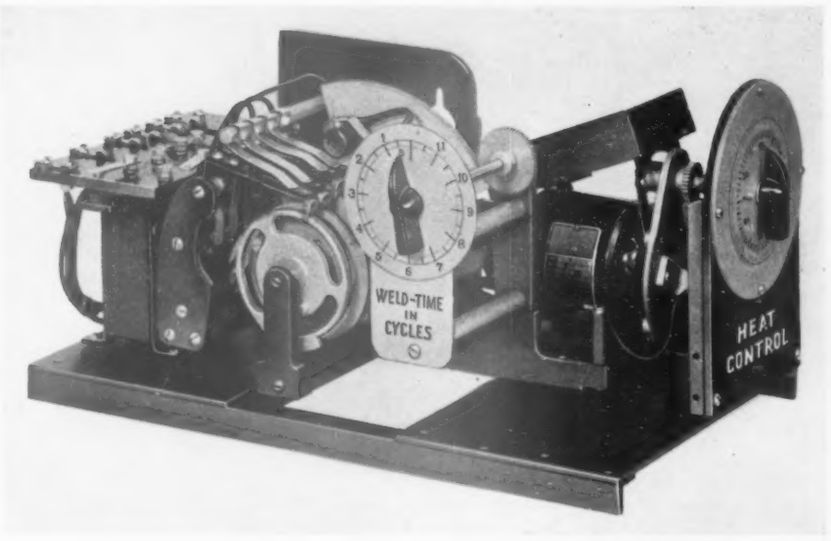
The Clegg Welding & Ornamental Iron Works, Provo, Utah, was faced with the necessity of producing a hoist in a hurry. There was no time to order parts so without even a blueprint, the work of building a hoist from old scrap parts of cars, pipe, and angles and a used electric motor was undertaken. Despite the fact that most of the material for this unusual hoist was obtained from

Lincoln Electric Co. Photo.

Combining a used electric motor with a few pieces of scrap plus welding resulted in this handy hoist.

the scrap pile, the working qualities of the hoist was not impaired. Since it was built it has been used in connection with a number of construction jobs, one of them involved the building of a Community Show Hall, which is one of the largest halls in the State of Utah.

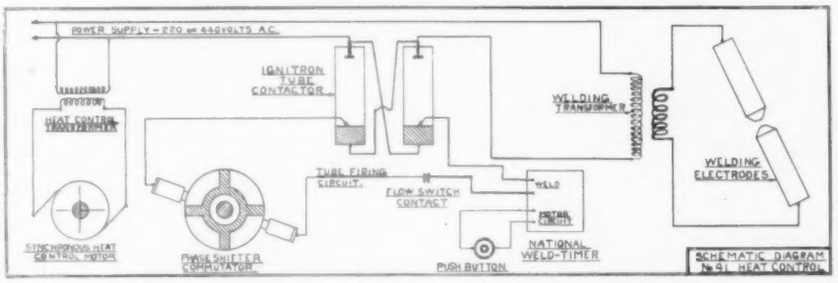
ANNOUNCING DUO-TROL



National's Newest Weld-Timer

FINGER TIP CHANGE OF WELD TIME.
FINGER TIP CHANGE OF TRANSFORMER HEAT.
Also Provides for Squeeze and Cool Control,—
ALL IN ONE COMPACT UNIT.

It has Momentary-Push, Non-Beat, Push Button Control.
Can be Used for Repeat, or Gun Welding by
Holding the Push Button Closed.
If your weld looks weak, add a cycle,—or 2½ cycles.
If your weld seems too Hot, cut down your Heat.
Yes! Do it INSTANTLY—Without Any Time Loss.
Here you can make a Total of 1080 Different Settings
Without Moving a Wire, or Changing a Tap.



Observe the Simple Hook-up and Equipment Diagram.
Requires an Ignitron Type of Tube Contactor, and if you use air for pressure, a common Solenoid Valve.
Here is Precision Control over your Spot Welding Operations.
If you are working with Stainless Steel, or carbon alloys, you know how you have to cut and try.
You know how variables creep in,—How your Jobs change.
You won't go wrong with DUO-TROL, National's Latest.
Mass Production is well acquainted with National Timers.
There are Thousands in use.
DUO-TROL is a National Timer, with Weld-Time Flexibility and Heat Control added, to meet National Defense Production Requirements.

NATIONAL TIME & SIGNAL CORPORATION
600 E. MILWAUKEE AVENUE DETROIT, MICHIGAN

This completely equipped welding shop saves time in repairing contracting equipment.

Portable Welding Shop

"Service anywhere or any place" is the claim of the William H. Ziegler Co., Inc., road and construction machinery dealers in Minneapolis, Minn. To make good this claim, it is practically necessary to have a welding shop on wheels for so much of the work involved in the repair of heavy construction equipment involves welding.

The Ziegler Co. do this job with a LeTourneau Tournacar Welder which is a complete welding shop capable of reclaiming broken equipment whether it be in the contractor's shop or in the field in service.

» «

Welded Roll Grab

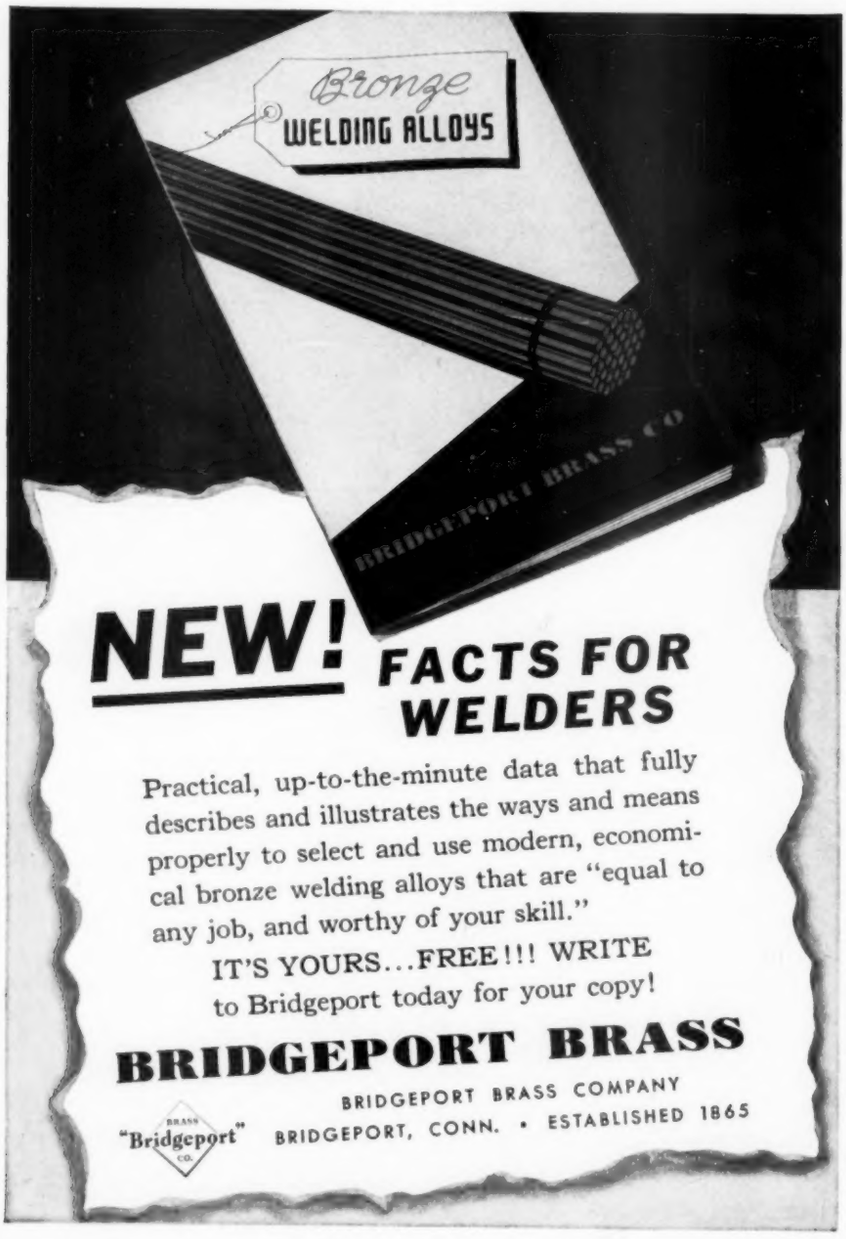
A completely motorized roll grab of weld construction has been developed by the Cleveland Tramrail Div., The Cleveland Crane & Engineering Co., Wickliffe, Ohio, for use with overhead materials handling systems. The grab will handle rolls from 16 in. min. to 60 in. max. diam. in lengths up to 72 in. and weights up to 5,000 lbs.

All motions of the grab are motorized and can be controlled from the crane operator's cab. Three motors are provided. One motor spreads and retracts the grab arms. Another squeezes the roll grippers after they have been brought close to the roll, and thus securely locks the roll in position and prevents any possibility of slipping away and falling in transit. The third motor operates the turn-over mechanism which makes it possible to pick up a roll in any position and place it in any other position. Thus a roll piled vertically can be picked up and placed in a horizontal position.

An all-welded roll grab capable of handling rolled materials weighing up to 5,000 lbs.

When a roll in the vertical position is to be picked up and delivered in a horizontal position, or vice-versa, the turn-over mechanism can be operated while the crane is in motion, thus saving time that ordinarily would be consumed for this operation.

The grab is especially suitable for the handling of all grades and thicknesses of paper, from light crepe and tissue paper, sound-deadening felt to kraft and hard box board. The grab, or variations of it, is suitable for handling bales, barrels, boxes, etc.


Bronze
WELDING ALLOYS
BRIDGEPORT BRASS CO
NEW! FACTS FOR WELDERS
Practical, up-to-the-minute data that fully describes and illustrates the ways and means properly to select and use modern, economical bronze welding alloys that are "equal to any job, and worthy of your skill."
IT'S YOURS...FREE!!! WRITE to Bridgeport today for your copy!
BRIDGEPORT BRASS
BRIDGEPORT BRASS COMPANY
"Bridgeport" BRIDGEPORT, CONN. • ESTABLISHED 1865

New Product Developments

Welding Torch

★ The **Weldit Acetylene Co.**, Detroit, announce a new lightweight **Welding Torch.** This torch, which weighs less than ¾ lb. is about 13 in. long. It has been especially designed for aircraft welding and the welding of light sheet steel. One of the features of this torch is its replaceable tip.

A light weight welding torch for aircraft welding.

» «

Refrigerated Welding

★ The Weltronic Corp., Detroit, has acquired patents, manufacturing and sales rights to the new type of refrigerating units for welding machines developed by Progressive Welder Co. These units will now be marketed under the trade name "Frostrode."

The new Weltronic "Frostrode" units are available in five standard sizes, ranging in their capacity from light steel spot welding for the small unit, to the largest unit for use with either a heavy steel welder or a bank of eight aluminum welders. Completely self-contained, the refrigerating units are quite simple to install. The Weltronic "Frostrode" welding process has been developed primarily for those welding jobs where water-cooling has proven inadequate. The units, however, make possible a material reduction in operating costs for resistance welding equipment of all types.

When used in connection with a spot welding machine, the new unit is said to reduce electrode temperature to a point where electrodes will be continuously covered with frost in spite of the high heat necessary to produce a weld.

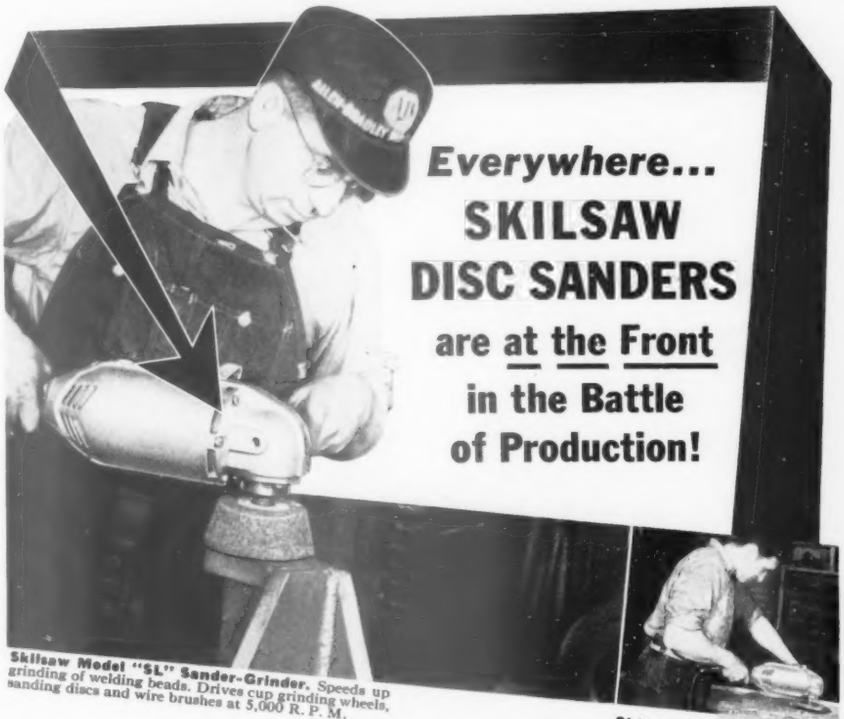
Sales of the "Frostrode" units to users will be handled by manufacturers of welding equipment and the York Ice Machinery Co. and installation will be under the supervision of either Weltronic Corp., York Ice Machinery Co., or the welding equipment manufacturers.

One of the new "Frostrode" units for refrigeration of resistance welding machines.

» «

Rod End Brushing Machine

★ **Moslo Machinery Co.**, 4516 Superior Ave., Cleveland, announce a **Welding**



Skilsaw Model "SL" Sander-Grinder. Speeds up grinding of welding beads. Drives cup grinding wheels, sanding discs and wire brushes at 5,000 R. P. M.

Skilsaw Model "G" Disc Sander. Removes spot welds ...smooths down welding beads ... blends metals to a smooth finish. Ideal for removing rust and dirt.

Skilsaw Model "N" Disc Sander. Quickly removes fins and scale from gray iron castings. Buffs, polishes, prepares for finishes on all surfaces.

Skilsaw Model "SL" Sander-Grinder. Grinds down fins on steel castings with 6 in. cup grinding wheel. Speeds up all metal cleaning, filing, surfacing.

Wherever the fight for production is fiercest—wherever war materials are being built fastest you'll find SKILSAW DISC SANDERS at work...speeding up every surfacing job...making each man, each minute more productive . . . saving days and dollars for quicker Victory!

SKILSAW DISC SANDERS are lighter, easier to handle and far more powerful. That's why they're so widely preferred in aircraft, tank and other war production plants . . . to speed up all sanding, grinding, filing, buffing and polishing. That's why they belong in your plant, too . . . for faster, better work on countless jobs with wire brushes, sanding discs, grinding wheels and polishing pads. Ask for a demonstration of SKILSAW DISC SANDERS. 6 POWERFUL MODELS.

SKILSAW, INC., 4763 Winnemac Ave., Chicago

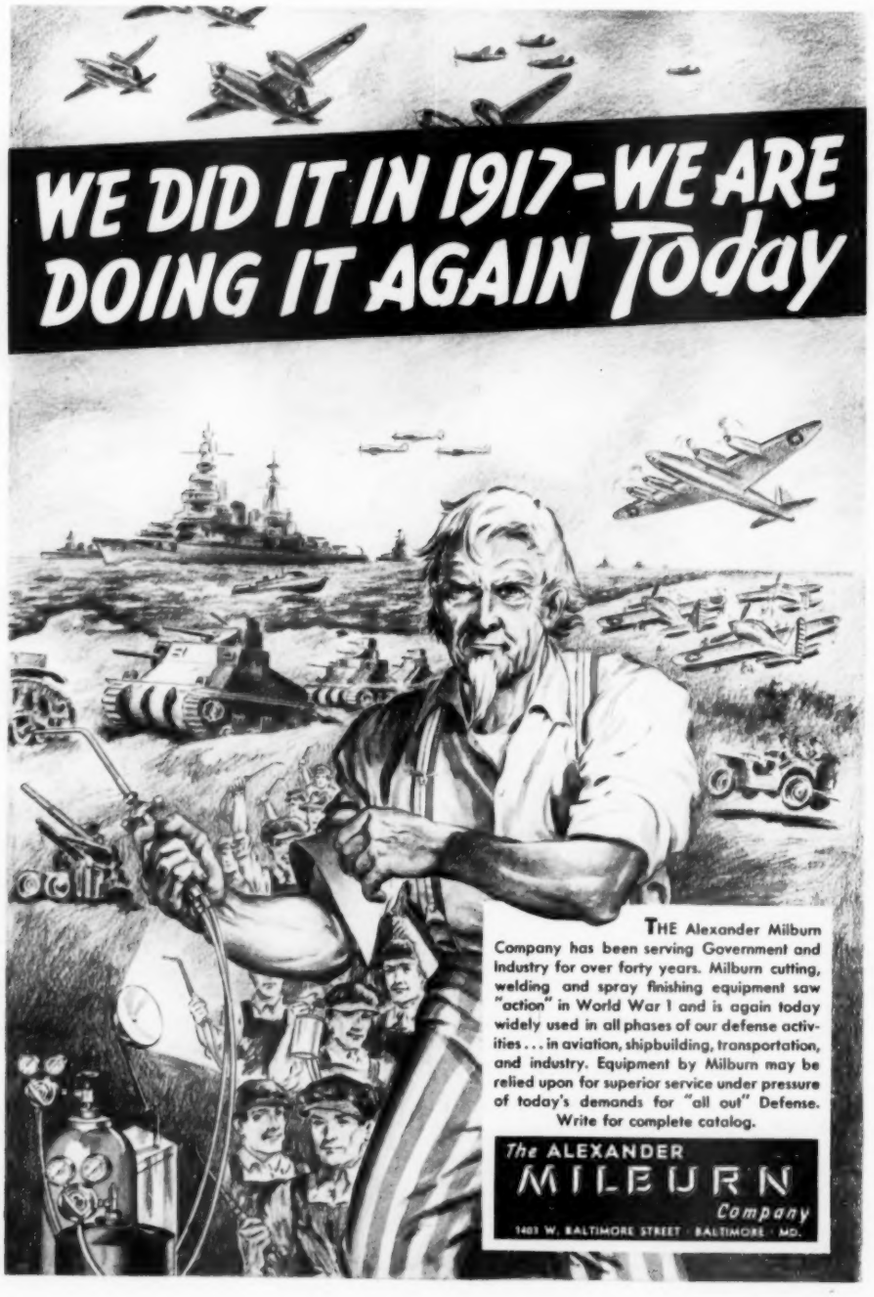
New York • Boston • Buffalo • Philadelphia • Cleveland • Detroit
Indianapolis • St. Louis • Kansas City • Atlanta • New Orleans
Dallas • Los Angeles • Oakland • Seattle • Toronto, Canada

SKILSAW PORTABLE ELECTRIC TOOLS

★ FOR THE DEFENSE OF AMERICA ★

Perfect alignment without scuffing of the electrode coating is the claim for this rod end brushing machine.

Rod End Brushing Machine claimed to be the most efficient machine of its type yet offered to the welding rod manufacturing industry. This new machine encloses its drive and conveyor in dustproof housings. Driven through gears, with shafts mounted on anti-friction bearings running in an oil bath, the dustproof enclosures assure extreme bearing life. An entirely new design of corrugated center conveyor belt makes for perfect alignment of the welding rods being processed, while its action is such that no scuffing of the flux coat is possible. This conveyor belt is easily removable. Individual adjustment is provided on steel stripping brushes so that any length or diameter of rod may be readily processed. Construction is such that perfect rod alignment is maintained with rods ranging from 12 to 18 in. lengths.


WE DID IT IN 1917-WE ARE DOING IT AGAIN Today
THE Alexander Milburn Company has been serving Government and Industry for over forty years. Milburn cutting, welding and spray finishing equipment saw "action" in World War I and is again today widely used in all phases of our defense activities . . . in aviation, shipbuilding, transportation, and industry. Equipment by Milburn may be relied upon for superior service under pressure of today's demands for "all out" Defense. Write for complete catalog.
The ALEXANDER MILBURN Company
1403 W. BALTIMORE STREET · BALTIMORE · MD.

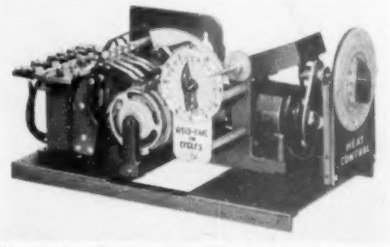
Brazing Unit

★ The **Ajax Electrothermic Corp.**, Trenton N. J., announce the new **Ajax-Northrup 6 KW** high frequency self-contained brazing unit. This unit has been especially designed for brazing 75 - 2 lb. bombs per hour. However, the high frequency equipment is convertible so that at a later date other forms of brazing may be undertaken. With this conversion it would also be suitable for melting alloys, sintering carbide tools or experimental heating at little expense.

An especially designed brazing unit that can be converted for standard uses.

Another feature of this brazing unit is its compactness. As a wholly self-contained unit its operation has been greatly simplified and at the same time it is readily portable.

» «



Finger tip change of weld time and finger tip change of transformer heat are two of the features of this timer.

Weld Timer

★ The **National Time & Signal Corp.**, Detroit, announce the **National Duo-Trol Weld Timer** in Combination with Heat Control for resistance welding where production processes require frequent changes of weld time setting, as well as positive control over transformer heat.

This combination unit provides heat control or phase shifting by fingertip dial setting and includes a similar method of varying weld time in 24 half cycle steps from ½ cycle weld time up. The movement of the heat control dial, one line division, makes it possible to change the heat about 2%. The unit is also

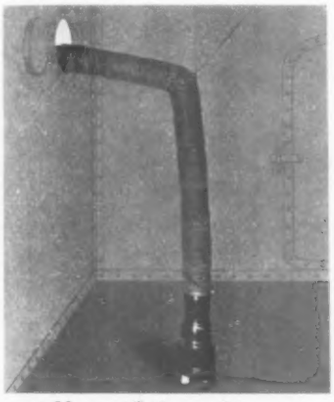
equipped with a separate control circuit to initiate squeeze time to the electrode as well as cool time after the weld is completed. In ordinary operations the pressure control can be pre-set and needs no further adjustment irrespective of the weld time employed.

The timer is motor driven and the time intervals are accurately calibrated and maintained by using a double cam, double circuit, series connected circuit. The timer is initiated by movement push button control.

» «

Ventilator

★ The **Coppus Ship-Hold Ventilator** is a recent development by the **Coppus Engineering Corp.**, Worcester, Mass., for use in removing welding fumes and to eliminate excessive temperature where men are required to work in confined spaces.



The portable ventilating unit assures plenty of fresh air for the worker.

This ventilator is equipped with a ½ h.p. total enclosed Universal motor suitable for use on either 110 or 220 volts. This motor drives a cast aluminum fan which is capable of delivering air at 1500 c.f.m. Stationary guide veins are mounted so as to direct the air stream beyond the fan. The diffuser, inlet thimble and supporting feet are of welded construction. The complete unit weighs 80 lbs. and may be lowered through a 14 in. dia. opening.

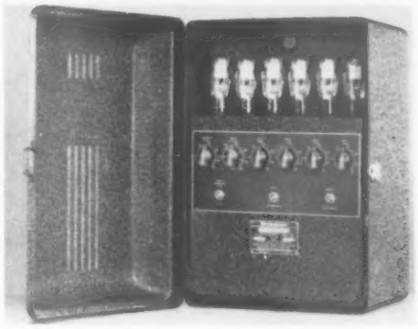
» «

Sequence Timer

★ A new weld and sequence timer has been announced by **Westinghouse Electric and Mfg. Co.**, E. Pittsburgh, Pa. Housed in a steel wall mounted enclosure, the unit is 17¼ in. high, 12 in. wide, and 12 in. deep. On a dead front panel, also of steel, are mounted the individual timing circuit, adjusting potentiometer knobs and dials, repeat and non-repeat switches, and the tubes.

The control transformer is wound for 115/230/460/515 v., 50/60 cycles. The solenoid relay is rated 25 amp. at 110 or 220 v. and 10 amp. at 440 or 550 v. Standard foot switch control voltage is 115 volts except when 24-volt circuit operation is specified.

The timing circuit is fully electronic and consists essentially of a resistor capacitor circuit whose charging rate is adjustable by varying a resistor. The voltage of the circuit is applied to the grid of a thyratron tube so that after a predetermining charging time has elapsed the thyratron is energized and operates the relay.



Simply turning the dials to desired setting for each period or function of the timer establishes the automatic timing sequence.

The timer divides the total time of a weld into the various intervals in which the welder goes through its operating sequence and includes a "weld" period of 3 to 30 cycles when the full welding current flows. When welding thick plates, brass, or stainless steel, timing facilities permit intermittent heating and cooling steps of from 3 to 30 cycles.

*Anaconda 997 (Low Fuming) Welding Rod, *Tobin Bronze and other Anaconda Copper Alloy Welding Rods are always "on call" for vital war work.

BRONZE WELDING SCORES ANOTHER PRODUCTION VICTORY

400 pounds of Anaconda 997 (Low Fuming) Welding Rod make this crippled press fit for work in 119 man hours.

A huge press like this, if disabled, ordinarily requires months to duplicate. When this one broke down while turning out needed war material, a tense situation resulted.

However, Hebeler Welding Company, Buffalo, N. Y. provided the way to give our war program the use of this press with a minimum delay . . . repair welding with Anaconda 997 (Low Fuming) Rod.

400 pounds of this bronze welding rod were used, 3100 cubic feet of air and gas were consumed and 119 man hours required for the chipping and welding which restored this press to active service. 4293B

*The trade-marks "Anaconda" and "Tobin Bronze" are registered in the U. S. Patent Office.

ANACONDA *Anaconda Welding Rods*

THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Connecticut

Subsidiary of Anaconda Copper Mining Co. • In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

News of the Industry

Engineers for the War Program

The Civil Service Commission, recruiting for the Federal civil service, is accepting applications for all grades and branches of engineering. Engineer examinations, some recently consolidated and modified, are listed below. None requires a written test. For the Junior grades, $2,000 a year, applicants are rated on their engineering education; no experience is required:

Junior engineer, aeronautical, naval architecture and marine engineering, Announcement 122. The usual college engineering course must include work in the optional branch chosen unless the applicant has taken an appropriate defense training course, or has had prescribed experience in the branch chosen. Age limit—40 years.

Junior engineer, all other branches of engineering, Announcement 172. A new feature is that certain college courses (other than the usual engineering courses) may also be accepted if supplemented by appropriate engineering defense training courses. Previous Announcement 51 admitted senior college students who will complete prescribed courses by June 30, 1942. The new examination also admits those who will complete such courses by June 30, 1943. Age limit—35 years.

In the upper grades, applicants are rated on education, experience, and record of accomplishments. In all but the chemical engineer examination, professional engineering experience may be substituted for the college work:

Chemical engineer, $2,600 to $5,600, Announcement 163. There is a shortage of engineers experienced in specialized branches of plant layout, equipment design, market analysis, chemical economics, heavy chemicals, plastics, rubber, agricultural by-products, and strategic minerals.

Naval architect, Announcement 98; marine engineer, Announcement 99; $2,600 to $5,600 a year.

Engineer (all other branches) $2,600 to $5,600 a year, Announcement 173. Especially needed, particularly in the associate and assistant grades, are engineers experienced in the following fields: Aeronautical, Electrical, Radio, Telephone, Mechanical (particularly machine design and development), Heating and Ventilating, Industrial, Sanitary, Hydroelectric, Irrigation, Construction-Estimating, Structural, Explosives, Plumbing, Public Health, Welding, Hydraulic.

For all upper grades the age limit is 60 years except that for the highest three grades of marine engineering and naval architecture—$3,800 to $5,600 a year—the age limit is 70 years.

Age limits do not apply to veterans granted military preference, up to the retirement age. Nonveterans over the age limit will not be eligible for permanent appointment, but they may apply, and, if they meet all but the age requirements, may be listed for defense needs not met through normal means.

Applications for all these positions are being accepted for several months or until further notice. Qualified engineers are urged, however, to apply at once, unless they have already applied in a recent examination and are eligible, for the position desired. Full information is given in the announcements which may be obtained with the proper application forms, at any first- or second-class post office or from the U. S. Civil Service Commission, Washington, D.C.

» «

"Engineering Production for Victory" is the keynote of the program for the Spring meeting of the **American Society of Mechanical Engineers** at Houston, Texas, March 23-25, 1942. The Rice Hotel will be the headquarters for the meeting.

» «

The 27th Annual Meeting of the **American Association of Industrial Physicians and Surgeons** will be held in

(continued on page 106)

A Pierce Flyball Governor is one of the most important parts of this complete welding rig, built and operated by Hammons' Portable Arc Welding Service. 300 ampere Hobart Welder is driven by 6-cyl. Pontiac engine. Pierce Belt-Driven Flyball Governors are easily mounted on any engine as shown here. *"To be sure of the weld, be sure of the governor!"*

with Pierce Flyball Governors

● "A good governor is just as essential as the motor," says Frank Hammons, head of Hammons' Portable Arc Welding Service, one of Indianapolis' leading welders. "We have been using Pierce Flyball Governors for the past seven years—and they do everything a man could want a governor to do. They act dependably to give recovery of current characteristics, within three-tenths of a second after striking arc, and hold the arc constant, weld after weld. Never any trouble with Pierce. When we find equipment that does the job *right,* we standardize on it. That's why we always specify Pierce Flyball Governors for our portable welding rigs."

●

Pierce Governors are standard equipment on most engine-driven welders. Write us for advice on efficient governing for better welding.

THE PIERCE GOVERNOR COMPANY, 1607 OHIO AVENUE, ANDERSON, INDIANA

Pierce Governors
STANDARD SINCE 1913

Reactor Lock and Heat Selector

This feature is used to securely lock the Reactor Rotor in any position against the fibre locking ring, when selecting the desired heat. Sufficient pressure is exerted to hold the Rotor firmly at this heat whenever locked.

All Flexible Cables

All connecting cables are made of fine-stranded copper wire covered with specially treated asbestos to give utmost flexibility and wearing qualities.

Fibre Stops and Locking Ring

The Fibre stops and locking Ring are constructed of a bone-hard gray composition, selected because of its non-magnetic qualities and resistance to pressure.

Mountings

Stainless steel, due to its low hysteresis, is used for all core mountings. It reduces eddy currents, thereby eliminating unnecessary heating at these points.

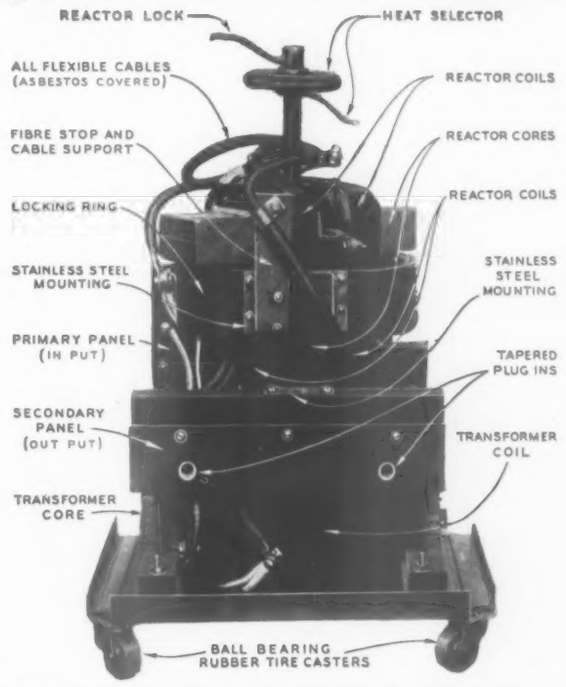
Primary and Secondary Panels

Both primary and secondary panels are built from canvas base phenolite, a highly insulating and moisture resistant material.

The Inside Story

OF THE

DIALARC A. C. WELDER



Reactor and Transformer Cores

Reactor and transformer cores are built-up of special electric steel, made exclusively for electrical use.

Reactor and Transformer Coils

All coils are wound of square copper wire covered with Class A insulation. The shape and size of the coils were pre-determined so as to properly dissipate heat without the need of artificial ventilation. Primary and secondary coils of the transformer are insulated with a sandwich of fish-paper and sheet mica. Each coil is heated to drive out atmospheric moisture, soaked in a phenolic varnish, and then baked until cured throughout.

•

SHOBER SALES Inc.

MANUFACTURERS AND DISTRIBUTORS

536 So. Aurora St.
STOCKTON, CALIFORNIA

SPECIAL WELDING POSITIONERS

10-TON ENGINE BASE POSITIONER

Prior to Installation in a Pit at Customer's Plant, Bringing Walk-way at Floor Level

THE PROBLEM

Close tolerances and complex construction of welded engine bases require a rigid supporting structure plus wide range of manipulation.

THE ANSWER

The cradle type positioner, illustrated, with gear drive at both ends of a rigid all-welded cradle, which rotates a full 360 degrees about its longitudinal axis and tilts 45 degrees each way from horizontal, fully satisfies these exacting requirements.

We Solicit

SPECIAL

Positioning Problems

BENTLEY WELDERY, Inc. **Syracuse, N. Y.**

DESIGNERS and MANUFACTURERS of WELDING POSITIONERS and SPECIAL EQUIPMENT

Photos by "Flash" Habermann

Nearly everyone had work to do at the Omaha Welding Confab.

conjunction with the 3rd Annual Meeting of the **American Industrial Hygiene Association.** These meetings are to be held at the Hotel Gibson, Cincinnati, Ohio, April 13th to 17th and will discuss the hazards to the health of war workers arising from the expanding production program. Included in the 50 papers to be presented are many discussions of interest in the welding field. In addition, the sessions will be highlighted by scores of exhibits, company meetings and informative exchanges of latest ideas for protecting industrial men.

» «

The **8th Annual Welding Confab** of the **Omaha Welding Co.**, while not the largest, was probably the best of the long list of successful welding conferences held by this Omaha jobber. This 4 day conference was attended by 740 job shop operators and weldors from most of the northern middlewest states.

The highlights of the meeting included daily lectures by a representative of the War Production Board on the subject of "Priorities and How they Affect the Job Shop Operator" and demonstrations by the various manufacturers' representatives who attended the conference. The following manufacturers had representatives in attendance: Aladdin Rod & Flux Co.; American Manganese Steel Co.; Depew Disc Sharpener Co.; Flood Safety Products Co.; Handy & Harman Co.; Haynes-Stellite Co.; Hobart Bros. Co.; Linde Air Products Co.; National Lead Co.; Osmundson Spade Mfg. Co.; Page Steel & Wire Div.; Shawinigan Products Corp.; Smith Welding Equipment Co.; Stoody Co.; *The Welding Engineer;* Titan Metal Mfg. Co.; *Welder's Digest;* Westinghouse Elec. & Mfg. Co. and Will-Weld Mfg. Co.

Personals

The **Lincoln Electric Co.**, Cleveland, announces the following new addresses for its branch offices:

Oklahoma City—19 N. Ellison St. **R. L. Looney,** Mgr., will be in charge and will be assisted by **O. L. Rogers** and **C. M. Bowen.**

Milwaukee—733 N. Van Buren St. **F. C. Archer** continues as District Manager.

Chattanooga—1111 James Bldg. **R. M. Daniels** is in charge.

Chicago—323-325 E. 23rd St. **G. E.** Tenney continues as Manager.

Omaha—521 S. 15th St. **Fuchs Machinery & Supply Co.** representing the Lincoln Co.

Dayton—246 Wiltshire Blvd. with **R. P. Sharer,** Manager, is in charge.

» «

New York Welding Supply Co., Inc., which was formerly located at 75-77 Grand St., New York, N.Y. moved on February 1st to its new quarters at 72 Grand St.

This company, which was established in 1909, began operations in a small garage and now occupies the entire building at 72 Grand St. It also maintains a branch store at 728 Eastern Blvd., Bronx, N.Y.

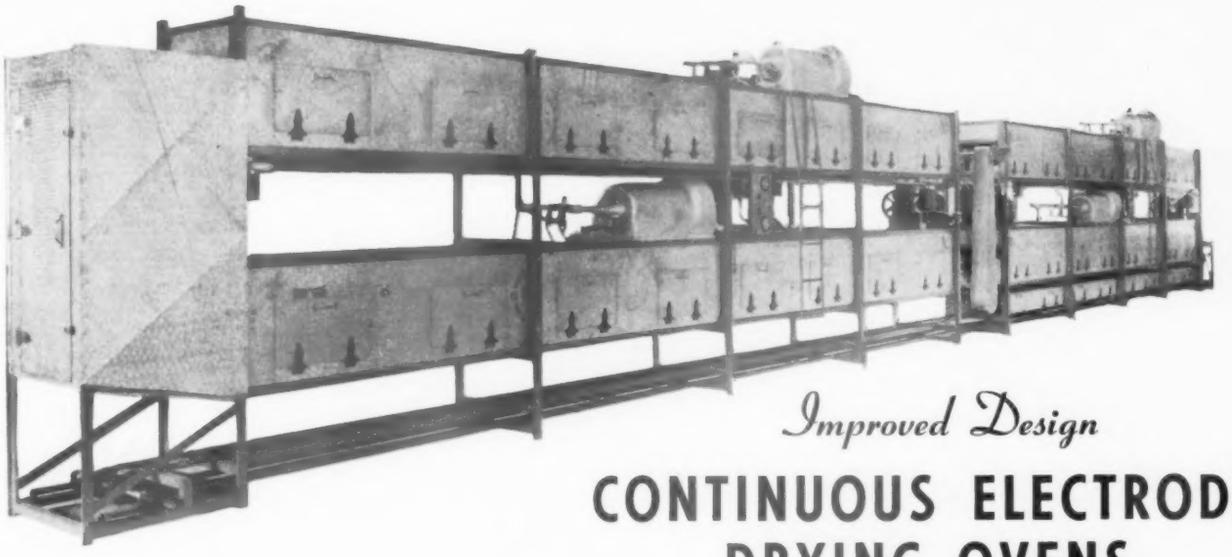
Frank Dusenbury who started the company in 1909, is president of the organization and is still actively engaged in its operations.

» «

Verner Lindstrom, formerly a chemist for J. H. Williams & Co., Buffalo, has joined the research staff of the laboratory of the Linde Products Co. at Tonawanda, N. Y.

(Continued on page 108)

GENERAL OFFICES & WAREHOUSE · · CHICAGO, ILLINOIS
WHITE FLASH
WELDING RODS &
ELECTRODES
SUPPLIES
Central Steel & Wire Company
WAREHOUSES
Chicago · REPUBLIC 3000 3000 W. 51ST Street
Detroit · PLAZA 6780 5035 Bellevue Ave.
Cincinnati · AVON 2230 525 Township Ave.
Dayton · FULTON 8181 1095 E. Monument Ave.
TELETYPE NUMBERS :- CHGO 1269 · · · DET 33 · · · CIN 64 · · · DAY 46



Improved Design

CONTINUOUS ELECTRODE DRYING OVENS

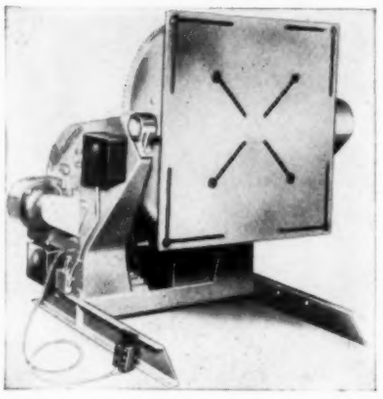
Steiner Oven Division STEINER OVENS FOR BEST RESULTS **STEINER-IVES CO.**

16 AVENUE L, NEWARK, N. J.

TANK AND ANTI-AIRCRAFT GUN PRODUCTION MOVES MUCH FASTER WITH

Ransome Welding Positioners

Now being used in producing TANKS— ANTI-AIRCRAFT— GUN MOUNTS— ARMOR PLATE— NAVAL GUN MOUNTS— NAVAL VESSELS



in SHIP YARDS— ARSENALS— PIPE WORKS— CHEMICAL PLANTS— OIL REFINERIES— and throughout industry

Indicative of the essential part Ransome Positioners are playing in the defense effort is the above list of items now being produced on these machines.

Bulletin No. 200-A is yours for the asking.

Industrial Division

RANSOME CONCRETE MACHINERY COMPANY

Dunellen, New Jersey

Personal

(continued from page 106)

The Board of Directors of Scully Steel Products Co., United States Steel Corp. subsidiary, at a meeting in Chicago, Feb. 11, elected **E. E. Aldous,** president and a director; **L. B. Worthington,** vice president and a director; and **Charles B. Vernooy,** comptroller, secretary and director.

Mr. Aldous has been associated for many years with various subsidiaries of United States Steel Corp. and previous to his election as president of the Scully Steel Products Co. he was manager of sales for United States Steel Corp. subsidiaries at Houston, Texas.

Mr. Worthington has spent his entire business career with Carnegie-Illinois Steel Corporation, a United States Steel subsidiary. After graduating from the University of Illinois, 1923, he became a sales apprentice at the South Chicago works of the Carnegie-Illinois Steel Corp. He served later in various positions in Chicago, St. Paul, and Detroit offices of Carnegie-Illinois, and on August 1, 1941, he was appointed manager of sales, bar, strip, and semi-finished materials of Carnegie-Illinois Steel Corp. at Pittsburgh.

Mr. Vernooy comes to the Scully Co. from the home office of the American Steel and Wire Co., United States Steel

(concluded on page 110)

FAST FLUX

FOR

SILVER BRAZING

The improved flux for silver solder brazing meets Government Specifications. Permits free flowing, effects strong bonds and is free from imperfections. No lumps, does not harden in storage. Excess easily removed with hot water.

Suitable for all forms of stainless steels, brass, aluminum-bronze, beryllium-copper, nickel and their alloys. Resistance, torch, high frequency, or atmosphere furnace brazing.

Large orders on yearly contracts at special prices. Free ½ lb. sample prepaid. No obligation, if requested on company letterhead. Try it, compare it, and you will use it.

FREE ½ LB. SAMPLE

AMERICAN CHEMICAL AND FLUX COMPANY

520 WEST 48th STREET
NEW YORK, NEW YORK

DON'T FORGET . . .

TO WRITE US AS SOON AS YOU CHANGE YOUR ADDRESS

Jobs are changing hands mighty fast now days—and for the same reason that it's more important than ever for everyone in the welding industry to know what's newest. So, in order that we can keep right up with you, please drop us a card with your new address when you move.

DON'T MISS AN ISSUE

of The

WELDING ENGINEER

Does PRODUCTION like this interest you?

101 EASY-FLO JOINTS PER HOUR!

That's the production one large washing machine manufacturer is getting by taking full advantage of Easy-Flo brazing alloy's **fast brazing action** and a rapid method of heating.

THE JOB . . .

A hex collar of cold drawn steel had to be joined to a steel tube, in the position shown at the right, to form a wringer post. The part is new, but after extensive experimenting Easy-Flo brazing was adopted as the best method of doing the job.

HERE'S HOW IT IS DONE

The operator, after cleaning surfaces to be joined, places the collar on the tube in its approximate position. He then slides a ring of Easy-Flo wire next to the collar and brushes on Handy Flux. Next he puts the assembled parts into an induction heating coil equipped with a fixture so designed that when the assembly is pushed down to the bottom, the collar is accurately positioned. While one assembly is heating, the operator prepares another, resulting in a steady flow of finished parts. Time per assembly is a little over ½ a minute—**101 joints per hour.**

FIND OUT WHAT EASY-FLO WILL DO FOR YOU

Easy-Flo joins ferrous, non-ferrous and dissimilar metals. Its brazing action is **fast** and the joints it makes **strong** and **reliable.** It can be used for a multitude of purposes. If you have a metal joining problem, **try it**—we'll be glad to cooperate. Send us full details and get our recommendations—or ask for a field engineer to call and give full details and a demonstration. Write for our new Bulletin No. 12 giving full details.

STEEL SALES CORPORATION

WAREHOUSES
Chicago, Ill., 3348 S. Pulaski Rd., Phone Crawford 4400
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CORTLAND GRINDING WHEELS

are especially adapted for WELD GRINDING

The FAST-CUTTING performance of Cortland Grinding Wheels is an important aid in speeding production in the welding shop or welding department.

But in addition to their fast-cutting qualities, Cortland Grinding Wheels also give longer life—in some cases as much as 50% longer than that of wheels previously used.

Use Cortland Wheels for grinding and finishing welds in your own shop and let them prove their ability to speed production and lower costs.

•

Write for name of nearest Cortland distributor.

•

There's a Cortland distributor in your vicinity. He can help you reduce your grinding costs.

CORTLAND GRINDING WHEELS CORPORATION CHESTER, MASS.

Like Water Off A Duck's Back

SPATTER-EX · FLASH-EX

Keep Spatter and Flash Off Both the Work and Machine Holder Jaws

Give it a coating of easily applied Spatter-Ex or Flash-Ex and you can forget about weld spatter or weld flash to grind or chip off your work.

Spatter-Ex prevents bonding of weld spatter in arc, flash, and butt welding. It is applied by brushing, swabbing or spraying and removed merely by washing parts with water or metal cleaner solution.

Flash-Ex will prevent resistance welding dies and holder jaws from becoming jammed with flash. It too may easily be washed off with water.

Write Today for Complete Details and Samples. There Will Be No Obligation.

Wayne CHEMICAL PRODUCTS CO.
9800 COPELAND AVE. DETROIT, MICH.

OTHER WAYNE PRODUCTS
Also Protex Non-Rust Oils, Production Lubricants and Meltomatic Paste Solder

Personal

(continued from page 108)

subsidiary, Cleveland, where he has been staff assistant to the Procedure Section. After attending Northwestern University, Mr. Vernooy, in 1919 entered the Chicago office of the Wire Company and all the intervening years have been spent in various positions in that organization.

» «

Elevation of **Harmon S. Eberhard** to a Vice-Presidency of Caterpillar Tractor Co.; creation of a new Research Department headed by **C. G. A. Rosen;** promotion of **G. E. Burks** to Chief Engineer; **J. R. Munro** to General Factory Manager and **Charles A. Woodley** to Factory Manager of the Tractor Division, have been announced by L. B. Neumiller, President.

Mr. Eberhard, who was named Chief Engineer in charge of all engineering activities of Caterpillar in 1933, now has administrative direction of Research, Engineering, Manufacturing, Industrial Relations and Training.

Mr. Burks joined the engineering staff of Caterpillar in 1928. From Chief Draftsman Mr. Burks was advanced in 1933 to supervision of experimental and research engineering at that plant, coming to Peoria in 1938 as Assistant Chief Engineer in charge of engine design.

Separated from the engineering department now are research activities which Mr. Rosen heads in his position as Director of Research. In 1928 Mr. Rosen became consultant to Caterpillar and a year later joined the company as engineer in charge of Diesel development, later becoming Asst. Chief Engineer in charge of Diesel research.

Mr. Munro, who takes over the top factory management job, became Assistant Superintendent of Engine and Tractor Assembly in 1933; Superintendent of Diesel Engine Assembly and Testing a year later and Factory Manager of the entire Tractor and Engine Divisions in 1936.

Mr. Woodley got his start as an apprentice. He advanced through the inspection, tool room and planning departments to a foremanship in 1934, general foreman in 1937 and Supervisor of Industrial Engine Assembly in 1938. In 1941 he was made Assistant Factory Manager.

Obituary

Alan G. Wikoff, Editor-in-Chief of the General Publicity Department of Union Carbide and Carbon Corp., New York, died in White Plains, N.Y., on February 11 at the age of 46. His home was in Pleasantville, N.Y.

Mr. Wikoff was graduated from the College of the City of New York with the degree of Bachelor of Science in Chemistry in 1916 and received his Masters Degree in Chemical Engineering from Columbia University in 1917. During World War I he was connected with the Chemical Warfare Service for 2 years. After returning to civilian life he became associated with the McGraw-Hill Publishing Company, Inc., where for 6 years he served in an editorial capacity. For the last 17 years, he has been associated with Union Carbide and Carbon Corporation.

Mr. Wikoff was a member of The American Chemical Society, American Welding Society, and International Acetylene Association, and had been particularly active on various committees of these societies.

» «

August Ziesing, former president of American Bridge Company, United States Steel Corporation subsidiary, died Feb. 16 at his home, Glencoe, Ill.

Mr. Ziesing was born February 19, 1858 in Peru, Ill. He was educated in both public and private schools and graduated with honors from the University of Illinois as a civil engineer in 1878.

Mr. Ziesing began his business career as a draftsman for the Pennsylvania Railroad and after two years was made assistant engineer in charge of operations. From 1883 to 1895 he was connected with the Lassig Bridge and Iron Works, Chicago, first as engineer and later as engineer and general manager. For the next five years he conducted a private practice as a consulting engineer, specializing in railroad structures.

When the American Bridge Co. was formed he was appointed western man-

"Tool-up" FOR SAFETY

Jackets

Sleeves

Aprons

Gloves
Both five finger and one finger styles.

SAFETY PAYS BIG DIVIDENDS
In Less Lost Time, Lower Compensation Costs and Better Satisfied Workers

Our line of protective clothing and equipment includes many styles of the items shown. Also *Leggings (Knee length and Spats) — Welding Curtains — Overalls — Electrode Carriers—Cover Glass Case—Sweat Bands—Electrode Holders, etc.*

Made from Chrome Leather, Fireproofed Duck or Neoprene Coated.

Write us about your requirements

Prompt Shipment is a Feature of our Service

INDUSTRIAL SAFETY EQUIPMENT ASSOCIATION

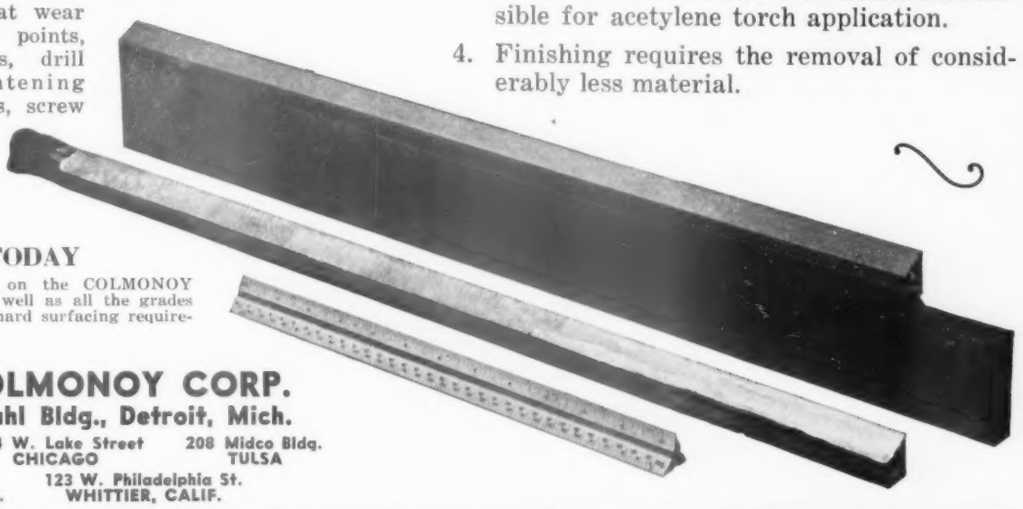
SAFETY Clothing and Equipment CO.
7016 EUCLID AVENUE · CLEVELAND, OHIO
Phone Endicott 1722

COLMONOY FURNACE WELDING

This process consists of applying a casting of COLMONOY No. 6 hard-surfacing alloy to steel base parts that are subject to corrosion, abrasion, wear and galling. Some of the advantages of this process are:

1. It is adaptable to high production parts.
2. There is complete freedom from porosity and cracks.
3. Parts can be hard-faced which are inaccessible for acetylene torch application.
4. Finishing requires the removal of considerably less material.

Use COLMONOY NO. 6 on parts subject to great wear and abrasion — lathe points, dogs, chip breakers, drill flutes, wire straightening shoes, thrust bearings, screw machine fingers, forming and drawing edges, etc.



WRITE TODAY

Ask for full information on the COLMONOY Furnace Weld Process, as well as all the grades of COLMONOY for every hard surfacing requirement.

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Sixth Floor, Buhl Bldg., Detroit, Mich.

558 W. 54th St. NEW YORK
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208 Midco Bldg. TULSA
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INCREASED PRODUCTION WITH HERCO AC WELDING!

PRECISION CONTROL

STREAMLINED ARC

X-RAY TEST PERFORMANCE

Models from 150 to 1500 Amps.

VARIABLE CORE PERMITS WELDING WITH THE EXACT HEAT

LOWER POWER COST

LARGER DIAMETER ELECTRODES SPEED-UP OPERATION AND LOWER PRODUCTION COST

24-HOUR OPERATION

JOBBER INQUIRIES SOLICITED!

hercules electric & mfg. company, inc.
2416 atlantic ave. brooklyn, new york

New GASWELD MODEL PH PRE-HEATING TORCH

Insures Smoother, Stronger Welds

THIS new Gasweld Torch has proved its efficiency in shipyards, gun plants and heavy manufacturing of all kinds. It is fast, safe and economical. Heats large areas more evenly than other pre-heating methods. Develops over 3500 F. when used with Propane, Butane or other petroleum gas. May also be used with manufactured or natural gas. Exclusive Gasweld "Free Flow" gas mixer prevents flashback.

Length: 28"; Weight: 2¾ lbs.; Positive grip ribbed handle. Well balanced. Easy to handle. Rugged construction.

AVAILABLE FOR IMMEDIATE DELIVERY

Weil Chemicals Division of
THE LIQUID CARBONIC CORPORATION
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Branches and Service Organizations in all Principal Cities

Gasweld

The Liquid Carbonic Corporation
3110 S. Kedzie Ave., Chicago, Ill.
Please send details on Gasweld Torch.
Also as checked: ☐ New Gasweld Catalog, out soon. ☐ Have salesman call.

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Company_____
Address_____
City_____ State_____

ager and on September 21, 1905 was elected president, the post which he held for more than 21 years until his retirement on April 1, 1927. During his years as president of American Bridge Co. the company's plant at Gary, Ind. was built and its Ambridge, Pa. plant was completed.

Among notable steel structures either fabricated or fabricated and erected by American Bridge Co. during Mr. Ziesing's administration were the Woolworth, Equitable, Metropolitan Power, American Telephone and Telegraph buildings in New York; the Chicago Union Station, Tribune Tower, Stevens Hotel, Palmer House, Pure Oil and Bankers buildings in Chicago; and the Union Trust Building in Cleveland. Other notable structures fabricated and erected under his supervision include the Hellgate Bridge in New York, the Williamsburg Bridge in New York, the largest swing bridge in the world crossing the Mississippi River at Ft. Madison, Ia., and other large Mississippi and Ohio River crossings. During the first World War the American Bridge Co., under Mr. Ziesing's supervision, built an ordnance plant at Gary, Ind. for the production of field artillery. It also furnished and erected fabricated steel for other important ordnance works and fabricated approximately one-half of the structural material used in construction of the Merchant Marine Fleet by the Emergency Fleet Corp.

Current Reviews

Welding Magazine

An arc welding news magazine **"Hobart Arc Welding News"** is now being published by Hobart Brothers Co., Troy, Ohio. This interesting publication will be sent free of charge to anyone writing the company's Direct Mail department and asking to be placed on the regular magazine mailing list. Editorial matter is made up from entries in the Hobart Arc Welding News Contest; letters to the editor; and articles by welding experts.

» «

Flame Cutting Bulletin

Airco "45", an 8-page illustrated booklet just issued by Air Reduction, New York, describes this new high speed machine cutting tip which is claimed to increase the speed of flame cutting 20 to 30%.

The booklet contains a complete pictorial presentation of the "45"—the newest addition to Airco's line. It explains clearly the design features. Performance facts and figures are described in text and chart form. A table of specifications enables buyers to tell at a glance the proper tip for their particular needs.

Copies of this booklet, ADC-631, can be obtained by writing **Air Reduction Sales Co.**, 60 E. 42nd St., New York.

» «

Revised Bronze Table

Ampco Metal, Inc., Milwaukee, Wis. has issued a revised **"Table of Bronze Specifications to Government Requirements"** which lists in parallel bronze specifications that are largely used by government contractors. This useful table lists all the alloy grade numbers cast by Ampco to these various governmental specifications. Chemical composition of each alloy is given for ready reference. The table will be sent free on request.

» «

Electric Gaging Booklet

Booklet GES-2543, recently issued by the **General Electric Co.**, tells in interesting, concise fashion of eleven outstanding instances where savings in both time and money, and at the same time improved quality, have resulted from the application of extremely sensitive yet sturdy electric gaging equipment.

The booklet illustrates such electric gages as the strain gage, pressure gage, film-thickness gage, eccentricity gage, profile gage, electrolimit gages, and the tensiometer. Applications for each are also suggested.

DANLY KWIK-KLAMPS
TOGGLE CLAMPS
FOR QUICK, POSITIVE
CLAMPING IN
ANY POSITION
WITH
STANDARD
HALF TURN
OR STRAIGHT
CLAMPING BAR

WRITE YOUR DANLY BRANCH
DANLY MACHINE SPECIALTIES, INC.
2100 So. 52nd Ave. • Chicago, Ill.
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Long Island City, N. Y. Detroit, Mich. Cleveland, Ohio
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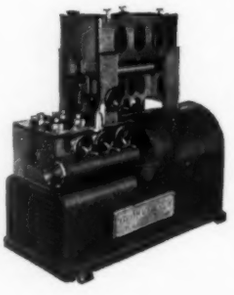
DANLY DIE SETS and DIE MAKERS' SUPPLIES

SOLVED!
THE WAY TO STRIP
COATED WELDING ROD ENDS



The *NEW* MOSLO WELDING ROD END BRUSHING MACHINE strips ends of coated welding rods *without* scuffing or injury to flux coat. Insures clean metal surface for perfect electrical contact. The most efficient machine yet offered to the welding rod manufacturing industry.

It's a companion machine to the MOSLO AUTOMATIC HOPPER ROD FEEDER, universally accepted as the finest machine built to feed rod to extrusion presses. Full details on either machine available.

Write to

MOSLO MACHINERY COMPANY
4516 Superior Avenue Cleveland, Ohio

REGISTERED **MANGANAL** U. S. PAT. OFFICE

(U. S. PATENTS 1,876,738, 1,947,167 AND 2,021,945)

APPLICATOR BARS

Round, Square, Flat, Special Shape for reclaiming worn Jaw Crushers, Mantles, R.R. Crossings, Dredge Bucket Lips, Tumblers, Pump Shells, Impellors, Dippers, etc.

Special Shape Applicator Bars for rebuilding tractor tread Grousers.

Cracked Manganese Bucket welded with MANGANAL Bare Electrodes.

Save Steel for National Defense

REPAIR WITH MANGANAL

WELDING ELECTRODES

Bare and Tite-Kote

Send for descriptive circulars and name of nearest distributor

STULZ-SICKLES CO. *Sole Producers* **91 N. J. Railroad Ave., Newark, N. J.**

TO MEET SPECIFIC

WELDING REQUIREMENTS

Use PERFECTION

WELDING ELECTRODES

PERFECTION P-60

For Single Pass Fillet Welds . . .

Here is a coated electrode designed especially for single or multiple pass welding of all types of mild steel sections where the fit-up is bad —for single pass fillet welds in marine and tank construction, structural assemblies and machine bases.

"Perfection" arc welding electrodes are manufactured to strictest specifications with the same care of making the finest quality "Perfection" rivets for 30 years—used throughout the United States in all classes of steel fabrication.

Write for our catalog describing uses and characteristics of various Perfection electrodes for use on Mild Steels, Cast Iron, Carbon Moly and Low Alloy High Tensile Steels.

THE ANTHONY CARLIN CO.

2717 East 75th St. CLEVELAND, OHIO

STOW FLEXIBLE SHAFT MACHINES

The "ONE BEST TOOL"

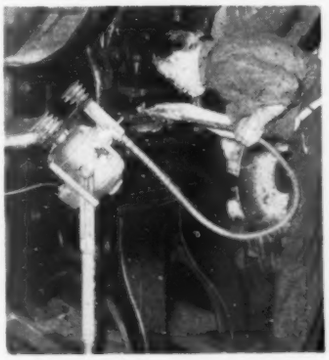
for Many of Your

TOUGHEST JOBS!

When finishing of irregular-shaped pieces can't be done by machine set-up . . . when individual fits must be made during final assembly . . . when hard-to-get-at jobs need machining . . . Stow Flexible Shaft Machines.

Stow units are true many-purpose machines—equally efficient for grinding, filing, drilling, wire brushing, buffing, sanding and polishing. Change-overs require only a few seconds. And for every job, they provide the *right* tool at the *right* speed!

Stow's 66 years of experience in flexible shafting—the most extensive in America. Stow units have ruggedness, handling ease and portability which lead to greater production at less cost. Write *today* for complete catalog.



On Maintenance Work as well as on the production line, Stow units save time and money. No long production hold-ups for repairing dies and doing other maintenance jobs. With Stow, you bring the machine to the work!

★ INVENTORS OF THE FLEXIBLE SHAFT

STOW MANUFACTURING CO., Inc.

7 SHEAR STREET BINGHAMTON, N. Y.

Current Review

(continued from page 112)

Calendar

Continental Machines, Inc., Minneapolis, have now available for distribution, a combination calendar and educational course on machine tools and machine shop practice. This calendar, which begins with the month of March, 1942, contains 12 comprehensive lessons on metal working. It gives a complete short course on machine tools and machine shop practices. Parts of the course are elementary for the benefit of apprentices and learners while other parts will be of interest to the old timers.

The calendar is large enough to be seen across a room measuring 40 x 22 in. A strong metal binding permits hanging of the calendar indefinitely without sagging or curling of the pages. The illustrations are suitable for mounting on heavy cardboard backing. With this backing the calendar can be used as charts or posters after the calendar has run out.

« »

Viewer Bulletin

In a 4 page bulletin recently released by **George Scherr Co., Inc.,** New York, there is described the **Magni-Ray.** This unit, which consists of a 2 in. lens having a magnification power of 3 plus, is complete with 2 light bulbs, electrical equipment, swiveling clamps and stand. It is designed to give clear, undistorted magnification combined with strong evenly concentrated illumination and is said to be suitable for detecting imperfections in weld seams, cracks in steel after hardening, burrs and poor finish on small parts. It can be used wherever magnification is called upon to aid the human eye.

» «

Welder's Catalog

In a new 16 page bulletin entitled **"Pulmosan Protective Clothing for Welders"** the **Pulmosan Safety Equipment Corp.,** Brooklyn, N. Y., describe their complete line of welder's coats, jumper suits, leggings, gloves, aprons, goggles, helmets, respirators and eye shields. For the convenience of the reader, this booklet has been made with self-indexing tabs. In addition to the welding line, the complete line of safety equipment manufactured by this organization is listed.

» «

A-C Generators Bulletin

For use in municipal lighting plants and for industrial emergency power, large a-c generators of from 25 to 2180 kva for diesel engine drive are described in a new 16-page bulletin announced by Westinghouse Electric and Manufacturing Co.

Rotor and stator constructions are discussed, attention being given to effective ventilation, insulation tests, and design features to give life-time operation. Electrical auxiliaries described are metal-clad switchgear, generator voltage regulators, and exciters. The Silverstat regulator which now replaces the vibrating type is discussed in some detail.

Representative installation pictures show generators of from 219 to 2180 kva driven by diesel engines.

A copy of bulletin **B-3028** may be secured from department 7-N-20, **Westinghouse Electric and Manufacturing Co.,** E. Pittsburgh, Pa.

» «

Vocational Guidance

A new vocational guidance booklet on engineering entitled **"Engineering as a Career"** has just been published by the Engineers' Council for Professional Development.

In the first section, "The Scope of Engineering" are included discussions of what engineering is and what engineers do, the functions of engineering, the engineering method, as well as answers to the question "who should study engineering?" and a survey of the probable opportunities and earnings. The second section of the book presents more detailed accounts of the activities of engineers in the various branches of the profession. The interrelationships among various types of engineering are stressed and consideration given to the use of engineering training and other fields of activity.

(continued on page 116)

CLEANWELD FLUXES

of

OUTSTANDING MERIT

for Oxy-Acetylene Welding and Brazing

FAST — CLEAN — ECONOMICAL

CAST-IRON FLUX
BRONZE FLUX
ALUMINUM FLUX
STAINLESS STEEL FLUX
COPPER FLUX
MONEL FLUX
SILVER SOLDERING & BRAZING FLUX
(contains no fluoride)

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Scientifically developed by

CLEANWELD PRODUCTS CO. 432 E. 71ST STREET NEW YORK, N. Y.

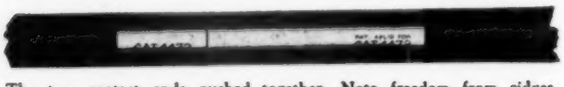
(Telephone BUtterfield 8-4753)

SAMPLES CHEERFULLY SUPPLIED ON REQUEST

"EITHEREND" CABLE CONNECTOR

Showing contact ends at right angles to each other, both exactly alike; pushed together they make one connector.

Both ends exactly alike



The two contact ends pushed together. Note freedom from ridges, and the smooth line-up with cable sheath.

Neither male nor female

Contact ends with rubber insulating sleeves; when connection is made, rubber sleeves butt, forming a weatherproof joint.

Also in the solderless type (by which cable is connected without using solder) in the following sizes: No. 1, 1/0, 2/0, 3/0, 4/0.

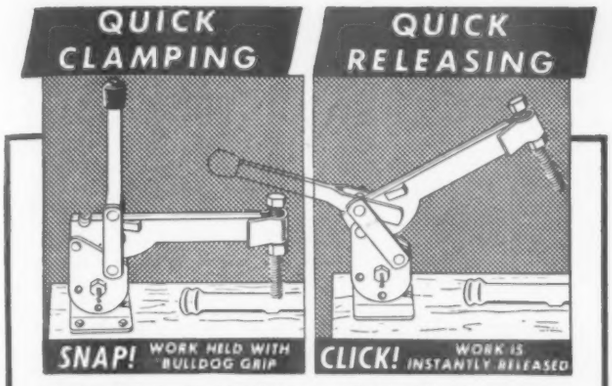
Send for Bulletin No. 49A which gives additional information and prices on this unique, welding cable connector.

These single conductor connectors are made in the soldered type for 8 and 10; 12 and 14; No. 3, No. 4, No. 5, No. 6; No. 1 and No. 2; 1/0 and 2/0; 3/0 and 4/0 wire and cable.

Albert & J. M. Anderson Mfg. Co.

289-305 A St., Boston, Mass.

NEW YORK PHILADELPHIA CHICAGO LONDON



KNU-VISE CLAMPS
STEP UP PRODUCTION

Knu-Lok Plier.
Develops pressure of 800 lbs.

No time wasted in fastening work—none wasted in releasing it when operation is completed. One motion of lever either clamps or releases. Enables handling of sub-assemblies with greater efficiency. Pressure is preadjusted and remains fixed. Models to meet almost any condition. Send for catalog and price list.

Midget Clamp
for aircraft work.
Develops 500 lbs. pressure.

KNU-VISE
INCORPORATED
16879 Hamilton Ave.
Detroit, Mich.

ACRO WELDERS
OF ALL CONVENTIONAL TYPES ARE AVAILABLE FOR PROMPT DELIVERY

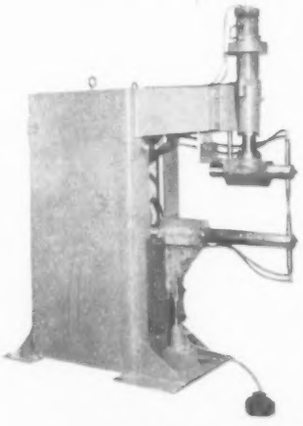


Illustration shows a heavy duty, deep throat, air operated, 100 kva. Spot Welder using hydraulic-controlled air cylinder, timing device, and accessories providing latest features of construction.

Foot, Air or Hydraulic - Operated, SPOT, PROJECTION, PULSATION, SEAM AND GUN WELDERS, 10 kva. upwards.

SPECIAL MACHINES FOR DEFENSE PROGRAM PRODUCTION

Send us your specifications.

Acro Welder Manufacturing Co., Inc.

1827 West St. Paul Ave., Milwaukee, Wis.

Builders of Brazers—Spot, Projection, Seam and Gun Welding Machines.

Overlaying Drawing and Forming Dies with

Finishing Costs Cut 50 - 75%

For years, Ampco Metal has been noted for its outstanding success as a forming and drawing die material. Ampco Metal is the only bronze hard enough to serve satisfactorily in the forming and drawing of mild steel, stainless steel, and many other alloys.

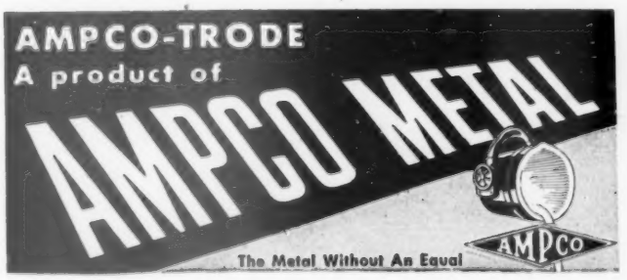
Now, through the use of Ampco-Trode welded overlays on steel and cast iron dies, the nongalling characteristics which have heretofore been available only in full Ampco Metal dies can be obtained at low cost. Ampco Metal coated welding rod marketed under the trade name of Ampco-Trode is a rod that the performance-minded, economy-minded, progressive plant engineer cannot afford to overlook.

Other Important Uses

Made in six grades of hardness—from 100 to 375 Brinell—and rod sizes from 1/8" to 1/2", Ampco-Trode coated aluminum bronze welding rods have a long list of uses, such as welding on steel, cast iron, Ampco Metal, ordinary brass and bronze, nickel alloys and alloy steels. Suitable for building up worn shafts, wear strips and valve seats; also, for refacing for extreme wear-resistance. You can use Ampco-Trode rods by all three methods—metallic arc, carbon arc and oxy-acetylene welding.

Ask for the new Ampco-Trode Bulletin which describes in detail application methods and welding technique. Illustrated with photographs and diagrams. Sent free on request.

AMPCO METAL, INC.
Dept. WR-3 Milwaukee, Wis.



Current Review

(continued from page 114)

A list of vocational guidance books and pamphlets also primarily concerned with engineering and related vocations is included. Copies of the booklet may be obtained from the **Engineers' Council for Professional Development,** 29 West 39th St., New York, at 10 cents each.

» «

Safety Tool Folder

"Protection Against Fire and Explosion" is the title of a folder issued by **Ampco Metal, Inc.,** Milwaukee, Wis. producers of Ampco non-sparking safety tools.

Designed to be used in the presence of explosive fumes, gases and dust, these tools are essential in ordnance plants, refineries, chemical plants and similar fields. Over 400 different items are carried in stock. The folder illustrates a varied selection of tools and contains a view of a typical kit.

» «

Business Bulletin

"How Small Industries Can Go After War Work" is the title of an illustrated booklet published by the **Copper & Brass Research Association.** The purpose of the booklet is to show small companies how to go after contracts or subcontracts through the Contract Distribution Branch, Production Div., War Production Board, Washington, D. C., or through its Regional Offices in many cities in each state.

The foreword of the booklet says: "Because of the unusually large number of persons who go to Washington, the personnel of the Contract Distribution Office there is taxed beyond its facilities. Officials of small industries are, therefore, requested to contact the Regional Office nearest the location of their plant. The directors and personnel of these offices are as well versed in giving information as to how contracts can be obtained as the main office in Washington.

"It is the purpose of the Contract Distribution Branch to harness the full productive power of American Industry in this titantic War Armament Program. Every manufacturer, large and small, can serve his country and himself by making full use of this Service."

The booklet contains information on how industry can secure loans for equipment to make war armament, how small companies can form pools to obtain contracts, and other helpful data.

A list of Regional Offices and addresses, the names of officers and telephone numbers are included.

A copy of the book can be obtained without charge by writing to the Association at 420 Lexington Avenue, New York, N. Y.

» «

Steel Products Manual

The American Iron & Steel Institute, New York, announces two revised sections to the Steel Products Manual.

The first of these is **Section 8** which deals with Hot Rolled Carbon Steel Bars. This booklet, which is in four parts, discusses general definitions and manufacturing practices, including ordinary and special manufacturing practices; standard steels, including limits and ranges for non-standard steels; standard mill practices, discussing standards permissible verifications for dimensions, weights and workmanship; and standard methods for packaging, loading and shipping. There is also included a glossary of metallurgical and shipping terms.

The other revised section of the Steel Products Manual is **Section 15** dealing with Hot Rolled Carbon Steel Wire Rods. This booklet is also in four parts discussing general definitions and manufacturing practices, standard steels including limits and ranges for non-standard steels, metallurgical terms and methods of packaging, loading and shipping.

Either of these Manuals may be obtained from the Institute for the price of 25c each.

Section 10 dealing with Alloy Steels, is a new section to the Steel Products Manual recently published by the American Iron & Steel Institute. This booklet deals with the general definitions of alloy steels, standard alloy steels and method of sampling and manufacturing practices. As a part of the booklet there is included ASTM specification D19-

(concluded on page 118)

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Acetylene Generators
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HOL-TITE

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Every welder knows how essential and necessary is a positive electrical contact. Hol-tite Holders solve that problem—and a number of others too. They feature replaceable jaws, hence no need to discard the entire holder when the jaws wear out . . . Positive vise grip makes bending rods a simple matter with slightly more pressure when tightening, giving a better bend and less waste on rod ends.

Hol-tite Holders were designed especially for heavy duty welding. In two models, one 300 amp. and one 400-500 amp. Spatter will not stick to the jaws . . . less heat transmitted to the holder . . . less operator fatigue . . . more feet of weld per pound of electrode . . . one handle will wear out many jaws.

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COLD FLANGERS

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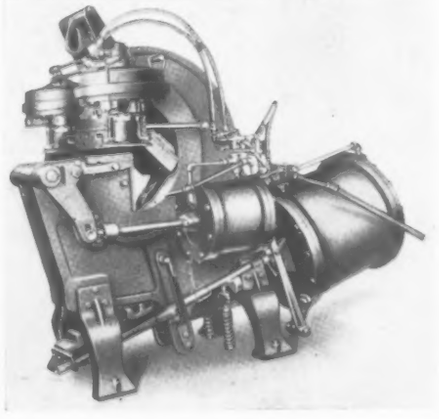

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Gives sound, tough, high strength joints, leak proof and resistant to vibratory stresses.

High corrosion resistance.

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The Unsung Heroes of the Production Line Find Comradeship and Cooperation in THE AMERICAN WELDING SOCIETY

The headlines usually feature the men on the firing line, naturally. But today the men who weld planes, tanks, ships, shells and other implements of war are receiving public recognition . . . no less warm, if less spectacular.

Particularly among their fellows . . . engineers, industrial executive, purchasing agents, draftsmen, foremen, welders, inspectors, contractors and sub-contractors, research workers . . . as well as engineering professors and students . . . these little known heroes of production receive the comradeship and cooperation they richly deserve. Men of this calibre have helped The American Welding Society to grow . . . in **members**, from a mere handful in 1919 to more than 4800 today . . . and in achievements, beyond any description.

In this National Emergency, when "Weld It!" is the synonym for speed, you owe it to yourself, as well as to your country, to consider joining The American Welding Society right away.

Here's what the Society and its 4800 members offer you in 1942:

1. **An opportunity to meet and talk with leaders of the welding industry at monthly Section meetings, at the annual Welding Exposition, and at other regional and national meetings.**
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3. **A chance to take an active part in developing better welding techniques and new applications. Research conducted under the auspices of the Welding Research Committee.**
4. **Membership Certificate; Membership Emblem (available at nominal cost).**
5. **YEAR BOOK telling "who's who" in welding.**

COST: Sustaining Membership, $100; Membership, $15; Associate Membership, $10; Operating Membership, $5; Student Membership, $2.50 a year.

The American Welding Society provides you who are interested in welding with a growing fund of data and ideas . . . any one of which may be worth many times the cost of many years' membership to you. Please write me for a free copy of our informative booklet on the Society.

J. D. TEBBEN, Chairman Membership Committee
THE AMERICAN WELDING SOCIETY
33 West Thirty-Ninth Street,
New York, N.Y.

Current Reviews

(concluded from page 116)

39T, Tentative Classification of Austenitic Grain Sizes and the SAE Recommended Practice for Rating Inclusions in Steel. Section 10 may be secured from the **American Iron & Steel Institute,** 350 Fifth Ave., New York, for 25c.

» «

Stainless Data

"Stainless Steel" is the title of a new 4 page bulletin recently released by the American Iron & Steel Institute, New York City. In this bulletin there is listed the standard type numbers and the composition ranges corresponding thereto for those stainless steels which have been approved by the **American Iron & Steel Institute.**

» «

Wire Bulletin

Section 16 of the Steel Products Manual of the American Iron & Steel Institute covers **Carbon Steel Wire.** This manual which is in two parts, covers general definitions and manufacturing methods of various steel wires for the many and varied uses of steel wire today. Part of the discussion is devoted to an interesting table for the converting of coarse round steel wire sizes from decimal to steel wire gages and numbers. The second part of the book is devoted to standard steels and means of identifying them and includes limits and ranges for non-standard steels.

Copies of this 48 page booklet may be secured from the **American Iron & Steel Institute,** 350 Fifth Ave., New York, for twenty-five cents.

» «

Substitutes Bulletin

In a 144 page booklet recently published by the American Iron & Steel Institute there is described the **Possible Alternates for Chromium, Nickel and Chrome-Nickel Constructional Alloy Steels.** Included as a part of the description are possible alternates for standard carbonizing grade steels. Under this particular section there is included numerous charts and curves covering physical properties, cooling speeds and end-quench hardenability.

Part 3 of the booklet discusses possible alternates for semi-thorough hardened steels of the 0.30 percent carbon class. Here again a number of curves supplement the text material.

Part 4 discusses possible substitutes for the through-hardening steels of the 0.35 carbon or higher. In this section there is included numerous tables giving the standard designations as well as the designations and alloying content of the alternate steels.

Part 5 discusses standard steels and standard methods for sampling, for check analyses and standard variations from specified chemical limits which are allowable.

This book is **No. 5** of the series **Contribution to the Metallurgy of Steel** which has been published by the Institute.

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will enable you to design and build the most efficient jigs and fixtures for clamping every type of work during welding, machining, drilling, reaming or assembly operations. The modern, low cost method.

A complete line, all sizes, each clamp carefully engineered for quick, positive action and long useful life. Thousands of De-Sta-Co Toggle Clamps now used to speed up work in National Defense plants.

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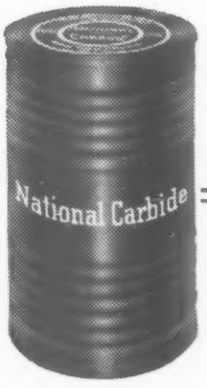

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Welding and Cutting
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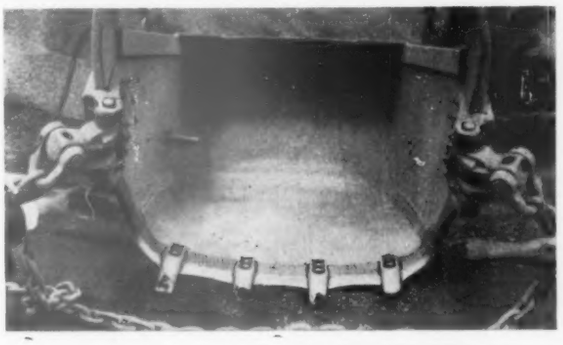
KEEP EM' GOIN'

Wherever possible today, material and equipment must be conserved. Not only is that a matter of choice, it's a matter of necessity. It's what COAST METALS hard facing rods *always* have done for the industry.



Here's How COAST METALS Keep 'Em Goin'

Coast Metals Give 8 Times Longer Service

Take the dragline bucket shown above. Edward C. Levy & Co. of Detroit applied one coating of COAST METAL No. 110 along the entire bottom, lip and knuckles of this dragline bucket, and they have already had eight months continuous service in a hot open hearth slag dump — no repairs and the bucket is still operating *in good condition.* On this same job an uncoated bucket would have required repairs every 30 days, including new wear strips, lips, knuckles, etc. This is typical of the saving you can make by using COAST METALS.

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The Ronay Arcronograph
Will Save Valuable Time *for You*

In Training: By detecting bad welding habits before they become fixed habits. By guiding the student to better arc control. By weeding out incompetent students at an early stage of training.

In Production: By revealing unsound deposits before they have been covered with following beads. By comparing the results of varying welding techniques. By checking the skill of operators from day to day.

The **ARCRONOGRAPH** is the only instrument made which gives a permanent record of the arc stream performance throughout the deposition time of each electrode.

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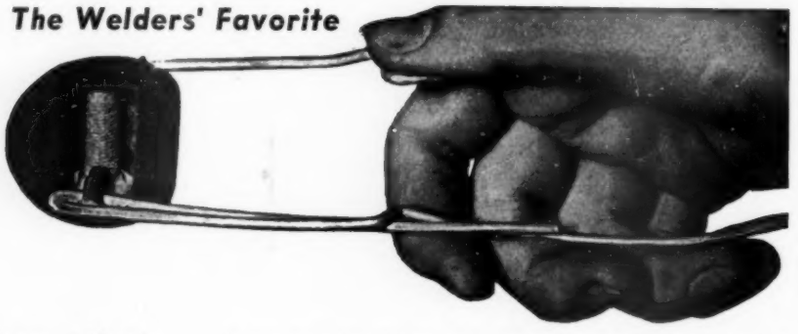
The Welders' Favorite



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Many superior design and construction features combine to make the improved "Round File" the most efficient and economical torch lighter.

An unusually large file area (approx. one sq. inch) is provided. The file is of superior quality, hardened in our own factory. Spark metal is of large diameter and the patented cartridge holding the metal locks exactly into position, permitting instant replacement. *Send for descriptive folders and prices.*

We also manufacture the dependable low-priced PYRO Lighter (flat-file type). Details on request.

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NEW! For Gas Welding Nickel Chrome Alloys,

MONEL, INCONEL, STAINLESS IRON and NICKEL, FLUXINE No. 18 is unequalled. Adheres to the rod in powder or paste form. Induces quick flow of rod and deep penetration. Flux scale chips off when work cools. Produces strong joints free from porosity. Meets U. S. spec. Write for sample. **Krembs & Company, 671 W. Ohio St., Chicago, Ill.** Chemists and metallurgists since 1875.

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Recent Patents

Welding Copper

2,269,581. **Donald K. Crampton,** Marion, and **Henry L. Burghoff,** Waterbury, Conn., assigned to **Chase Brass & Copper Co., Inc.,** Waterbury, Conn. Filed July 31, 1940. Issued Jan. 13, 1942. Alloys made in accordance with this patent are well suited for use as welding rods in the welding of copper, low tin content bronze, and low zinc content brasses. In the arc welding of such base metals, considerable difficulty is frequently encountered due to gas inclusions and lack of "wetting" of the metal by the molten welding rod. The new rod has unusual wetting power. The rod is formed from an alloy consisting of: nickel from about .50% to about .10%; phosphorous from about .05% to about .50%; tin, if any, up to about 2%; and the balance substantially all copper. The bead of this weld metal is noticeably lower and flatter than when ordinary low or high tin phosphorus bronzes are used as welding rods. This results in a lower consumption of welding rods per inch of weld. A faster rate of welding also results.

» «

Welding Pressure Vessels

2,268,343. **John T. Phillips,** Plainfield, N. J., assigned to **Foster Wheeler Corp.,** New York, N.Y. Filed Dec. 20, 1938. Issued Dec. 30, 1941. This invention relates to electric arc or gas welding of tubular members such as nozzles, to pressure vessels, conduits, and the like. The joint that is welded is a T-joint. According to this method, the tubular section, such as a nozzle, which is to be welded to the side of another tubular section, is selected having a cross-sectional flow area or diameter smaller than that desired for the finished section. Then an opening is provided in the side of the other tubular member which is the zone of welding. The two members are positioned for welding in such a manner as to leave a welding groove. Then the groove is filled with weld metal from the outside only to make the weld. By a boring operation, the arm section, such as the nozzle, is machined so as to provide the desired diameter and at the same time to remove the unfused weld metal at the root of the weld at the inner part of the welded joint.

» «

Welding Boilers

2,268,368. **James L. Anderson,** Closter, N. J., assigned to **Air Reduction Co., Inc.,** New York, N.Y. Filed Apr. 21, 1939. Issued Dec. 30, 1941. A machine is described for welding range boilers and the like in which large tubular sections are seam welded. The device

(Continued on page 122)

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The Economical Hardfacing Metal

Resisto-Loy deposits are really hard all through —not just hard particles in a soft bond. Highly resistant to acid and alkaline corrosion. Deposits show remarkable red hardness. Resisto-Loy is suited for D.C. or A.C. Arc and Oxy-Acetylene application. It is a non-ferrous alloy of chromium, molybdenum, copper, manganese and carbon.

COMPOSITION: Physical properties after depositing on mild steel:
Hardness: 610 to 627 Brinell, 61 Rockwell
Tensile strength: 90,000 lbs. per inch.
Elongation: Nil
Coefficient of Expansion: .000,007,3 inch per degree F.
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➤**ISOROD** . . . A real *self-hardening* alloy that is truly forgeable and highly abrasion-resistant. Easily applied.

Write for application details and specifications

THE RESISTO-LOY CO.
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THE
SCIENCE & PRACTICE
OF
Welding
by A. C. DAVIES

444 pages **328 diagrams** **$2.25**

The basic theoretical principles of welding and the practical methods of applying them. Chapters on Chemistry of Welding; Ferrous and non-ferrous Metals; Oxy-acetylene Welding; Electric Arc Welding; Gas Cutting; Inspection and Testing of Welds; Additional Processes (Automatic metallic arc. Atomic hydrogen arc. Resistance. Seam. Upset butt. Flash butt. Thermit). Engineering Drawing. Appendices giving tables, costing, and test questions.

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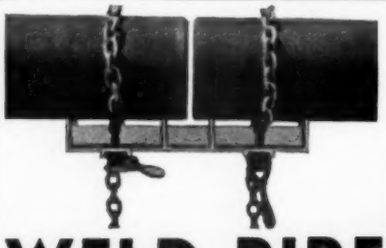

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Weld more pipe in a day with Jewel Pipe Clamps. They keep the welder welding instead of waiting, for it only takes a minute to put them on and set the pipe in perfect alignment.

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Write Today for Circular Giving Complete Details

JEWEL Manufacturing Company
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ST. PAUL, MINNESOTA

Recent Patents

(continued from page 120)

includes a seamwise extending heating element for raising the seam edges of a traveling tube blank to a welding condition, and a number of successive roll stands through which the tube blank travels while passing from one end to the other of the heating element. Each roll stand includes rolls that confine the tube blank and maintain the edges in a desired spaced relation during the heating of the edges. There are also provided restraining guides between the roll stands, shaped to the desired contour of the tube blank between the roll stands and disposed to control the spacing of the edges while the edges are traveling between successive roll stands.

» «

Stud Welding

2,268,416. **Edward F. Nelson,** Vallejo, Calif. Filed April 1, 1940. Issued Dec. 30, 1941. To assist in maintaining a flux material intact during the welding of stud-like members to metallic objects, the inventor has devised a stud having an enclosed quantity of flux material positioned in a thin shell cap at the end of the stud. This permits stud welding onto vertical surfaces without loss of flux. The shell of the flux cap melts at the welding temperature and releases the flux in the welding zone without loss or spattering.

» «

Welding with Adhesive

2,268,520. **Frank J. Wesley,** Brooklyn, N. Y. Filed Mar. 22, 1940. Issued Dec. 30, 1941. An adhesive comprising nitrocellulose and acetone is shown to be useful to hold two metal sections together in predetermined position prior to and during the welding operation. The adhesive serves not only to hold the metal parts in position, but also it acts as a preservative of the iron or steel, preventing oxide of iron from forming in the event any airhole should exist in the weld. The burning of the adhesive also burns all foreign matter with it, thus improving the welding job. The process is described as having particular utility in the welding of parts in ship building and in automobile manufacture.

» «

Weld Testing

2,268,815. **Russell A. Funk,** Pleasant Ridge, Mich. Filed June 17, 1940. Issued Jan. 6, 1942. The arrangement in this patent is such as to permit sequentially welding parts together and testing the strength of the weld in the minimum length of time. The testing mechanism is of the type operated in dependence upon the pressure applied to the work by the electrodes to exert a pull on one of the parts of the work with sufficient force to effectively test the strength of the weld.

» «

Welding Flux

2,269,167. **Gareth G. Somerville** and **Garnett H. Porter,** Pittsfield, Mass., assigned to **General Electric Co.** of New York. Filed June 21, 1939. Issued Jan. 6, 1942. The patentees produce a flux from the natural mineral wollastonite by removing therefrom its gas-forming constituents. Either before or after removing its gas-forming constituents, they reduce it to crystal-like particles of a size suitable for use in flux shielded arc welding. The wollastonite contains approximately 95 per cent of a complex calcium silicon oxide and small percent-

(concluded on page 124)

GAS LIGHTERS

ROUND FILE — FLAT FILE — AUTOMATIC
NATION'S LARGEST ASSORTMENT

FLINT RENEWALS FOR ALL MAKES OF LIGHTERS
LIGHTERS FOR EVERY PURPOSE

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You don't have to set aside your rod holder every time it is necessary to chip with a cold chisel and hammer. With the combination drift-chisel and brush feature of this hammer, one hand is always free for manipulation. C.M. & D. hammers are ideal for chipping and brushing in close quarters.

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MACOLOY

Phosphide Alloy Low Temperature Brazing Rods

Whether brazing copper, brass, ferrous, stainless steels, alloy or dissimilar metals—MACOLOY Type "F" will do the job. Macoloy is a new patented phosphide alloy with corrosion and acid resistant properties. Actually fluid at 1180° F., it can be used in gas, metallic and carbon arc methods. Self-fluxing for most purposes.

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Also welding rods for hard facing, corrosion and acid resistance.

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Here's a Practical Welding Fume Collector* that Removes Noxious Gases, Heat and Smoke at the Source

*Pat. Re-21,277

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» «

Condenser Welding System

2,269,460. **Hans Klemperer,** Belmont, Mass., assigned to **Raytheon Mfg. Co.,** Newton, Mass. Filed Feb. 5, 1940. Issued Jan. 13, 1942. This invention relates to welding systems in which electrical energy is stored in a condenser and then discharged into a welding load circuit in order to deliver welding current to a resistance welding load.

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Automatic Welding

2,269,369. **Georg Hafegut,** Weiz, Germany, assigned to **"Elin" Aktiengesellschaft,** Vienna, Germany. Filed July 17, 1939. Issued Jan. 6, 1942. The process of welding work pieces together by electric arc welding with fully coated weld rods comprising placing the edges of the work pieces close together in the relative position in which they are to be joined together, placing an elongated fully coated weld rod longitudinally along the edges to be joined, covering and mechanically pressing on the weld rod with a rigid, solid body, supplying the weld rod and work with welding current so that an arc strikes from the end of the rod to the work and fuses the rod to join the edges of the work and travels longitudinally of the rod and work as the welding progresses while the rigid, solid body covering the weld rod substantially excludes the atmosphere from the welding zone and directs and guides the path of the arc and the flow of the slag. The solid covering body also constrains the weld rod, including the portion of the rod from which the arc is striking, to remain close to the edges of the work pieces to be joined by resisting tendencies of the weld rod to be deformed away from the work under the influence of the heat. Butt and fillet joints can be produced according to this process. The process is stated to be many times faster than normal hand welding.

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Automatic Welding

2,269,484. **Bela Ronay,** Annapolis, Md. Filed Dec. 14, 1938. Issued Jan. 13, 1942. An arc-welding machine is described having elements for automatically regulating the rate of deposition of metal with respect to the melting rate of the electrode. The machine is capable of maintaining the arc at a constant predetermined length regardless of variations in the melting rate of the electrode. The machine includes an electrode and an electrode carrying element comprising a solenoid having the electrode adjustably attached thereto. There is also a trackway for the solenoid comprising a hollow tube of non-magnetic material. A piston of magnetic material is movable within the tube; and this piston can be moved. The solenoid can be energized and when energized it follows the movements of the piston along the tube. The piston is moved by a fluid pressure unit, and the pressure is regulated in accordance with the value of the arc potential of the welding arc.

» «

Reclaiming Weld Metal

2,269,538. **Mys M. Lewbers,** Bayside, N. Y., assigned to The **Linde Air Products Co.,** of Ohio. Filed May 5, 1939. Issued Jan. 13, 1942. An improved process and apparatus is shown for depositing granular welding material along a line to be welded, reclaiming the unfused portion of the material, and returning this unfused portion to the welding region either alone or mixed with new welding material, or depositing it separately either beneath or above a layer of new welding material. Any fumes evolved through decomposition of the welding material is progressively removed from the welding operation as they are evolved.

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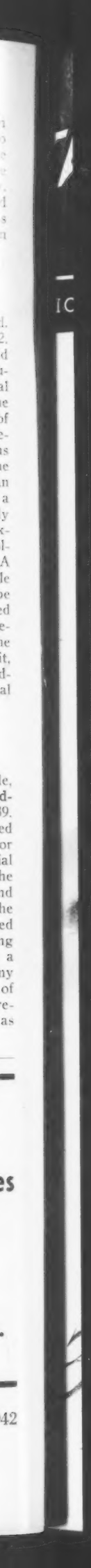

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